SCHEME & SYLLABUS FOR PROGRAM B. TECH INFORMATION TECHNOLOGY

B.Tech (Information Technology)

3rd Semester

Effective From 2007-08

Code	Paper	L	T	P	Th	Sessional	P/VV	Total	Duration of Exam	Credits
IT-201	Digital Electronics	3	1	-	60	40	-	100	4	3.5
HUT-211	Organizational Behavior	2	1	-	60	40	-	100	3	2.5
IT-203	Object Oriented Programming Using C++	3	1	-	60	40	-	100	4	3.5
IT-205	Data Structures	4	1	-	60	40	-	100	5	4.5
IT-207	Web Site Design	3	1	-	60	40	-	100	4	3.5
IT-209	Program Design and File Structures	3	1	-	60	40	-	100	4	3.5
IT-211	Digital Electronics (P)	-	-	2	-	60	40	100	2	1
IT-213	Object Oriented Programming Using C++ (P)	-	-	2	-	60	40	100	2	1
IT-215	Data Structures (P)	-	-	3	-	60	40	100	3	1.5
IT-217	Web Site Design (P)	-	-	2	-	60	40	100	2	1
IT-219	Program Design and File Structures (P)	-	-	2	-	60	40	100	2	1
	TOTAL	18	6	11					35	26.5

Bachelor of Technology (Information Technology)

Scheme of Courses/Examination

(4^{th} SEMESTER)

WEF Session 2007-08

S. No.	Course No.	Subject	Teaching Schedule				Examination Schedule (Marks)				Duration of Exam (Hours)	Credits
			L	T	P/D	Tot	Th	Sess	P/VV	Tot		
1	IT – 202	Computer Organization & Architecture	3	1	-	4	60	40	-	100	3	3.5
2	IT – 204	Unix & Linux Programming	3	1	-	4	60	40	-	100	3	3.5
3	IT – 206	Database Management Systems	3	1	-	4	60	40	-	100	3	3.5
4	IT – 208	Java Programming	3	1	-	4	60	40	-	100	3	3.5
5	MAT-206	Mathematics-V	4	2	-	6	60	40	-	100	3	5.0
6	IT – 212	Operating Systems	3	1	-	4	60	40	-	100	3	3.5
7	IT – 214	Unix & Linux Programming (Pr)	-	-	2	2	-	60	40	100	2	1.0
8	IT – 216	Database Management Systems (Pr)	-	-	3	3	-	60	40	100	3	1.5
9	IT – 218	Java Programming (Pr)	-	-	2	2	-	60	40	100	2	1.0
10	IT – 222	Operating System Pr	-		2	2	-	60	40	100	2	1.0
			Total			19	7	9	35			27

NOTE: Students of all branches will undergo a practical training of 6 weeks duration after the 4^{th} semester exam.

Bachelor of Technology (Information Technology)

Scheme of Courses (5th SEMESTER)

w.e.f Session 2009-10

Course No.	Subject	Teaching Schedule				Examination Schedule (Marks)				Duration of Exam (Hours)	Credits
		L	T	P	Tot	Th	Sess	P/VV	Tot		
IT – 301	Design and Analysis of Algorithms	4	1	-	5	60	40	-	100	3	4.5
IT – 303	Software Engineering	3	1	-	4	60	40	-	100	3	3.5
IT – 305	Microprocessors	3	1	-	4	60	40	-	100	3	3.5
IT – 307	Computer Networks	4	1	-	5	60	40	-	100	3	4.5
IT – 309	Communication Systems	4	1		5	60	40	-	100	3	4.5
IT – 311	Algorithms Pr			2	2	-	60	40	100	3	1.0
IT – 313	Software Engineering Pr	-	-	3	3	-	60	40	100	3	1.5
IT – 315	Microprocessors Pr	-	-	2	2	-	60	40	100	3	1.0
IT – 317	Advanced Java Pr	-	-	3	3	-	60	40	100	3	1.5
IT – 319	Seminar	-	2	-	2	-	100	-	100	-	1.0
IT – 321	Training viva	-				-	100	-	100	-	2.0
Total		18	7	10	35				1100		28.5

Bachelor of Technology (Information Technology)

Scheme of Courses (6th Semester)

w.e.f Session 2009-10

Course No.	Subject	Teaching Schedule				Examination Schedule (Marks)				Duration of Exam (Hours)	Credits
		L	T	P	Tot	Th	Sess	P/VV	Tot		
IT – 302	Object Oriented Analysis and Design using UML	3	1	-	4	60	40	-	100	3	3.5
IT – 304	Software Quality Assurance	3	1	-	4	60	40	-	100	3	3.5
IT – 306	Automata Theory	4	1	-	5	60	40	-	100	3	4.5
	Departmental Elective-1	3	1	-	4	60	40	-	100	3	3.5
IT– 312	Computer Networks Pr	-	-	3	3	-	60	40	100	3	1.5
IT – 314	Advanced Pr I	-	-	3	3	-	60	40	100	3	1.5
IT – 316	Visual Programming and Server Side programming Pr	-	-	3	3	-	60	40	100	3	1.5
IT – 318	Software Testing Pr	-	-	3	3	-	60	40	100	-	1.5
HUT-322	Soft skills Workshop	-	2	-	2	-	100	-	100	-	2.0
HUT-311	Business Management	3	1	-	4	60	40	-	100	3	3.5
Total		16	7	12	35				1000		26.5

List of Courses for Departmental Elective - I

1. **IT-322Information Security**
2. **IT-324Advanced Database System.**
3. **IT-326VHDL**

Bachelor of Technology (Information Technology)

Scheme of Courses (7th SEMESTER)

W.e.f Session 2009-10

Course No.	Subject	Teaching Schedule				Examination Schedule				Duration of Exam	Credits
		L	T	P	Tot	Th	Sess	P/VV	Tot		
	Open Elective-I	3	1	-	4	60	40	-	100	3	3.5
IT – 401	Advanced Data Structures	3	1	-	4	60	40	-	100	3	3.5
IT – 403	Compiler Design	3	1	-	4	60	40	-	100	3	3.5
IT – 405	Software Project Management	3	1	-	4	60	40	-	100	3	3.5
	Departmental Elective II	3	1		4	60	40	-	100	3	3.5
IT – 411	Advanced Data Structures Pr			3	3	-	60	40	100	3	1.5
IT – 413	Minor Project	-	-	6	6	-	60	40	100	3	6.0
IT – 415	Training Viva	-	-	-	-	-	100	-	100	-	3.0
IT – 417	Seminar	-	1	-	1	-	100	-	100	-	1.5
Total		15	6	9	30				900		29.5

List of Courses for Departmental Elective II

1. **IT-421 Data Warehousing and Data Mining**
2. **IT-423 Advanced Communications**
3. **IT-425 Computer Graphics**
4. **IT-427 Security & Cryptography**
4. **IT-429 Mobile Computing**

Bachelor of Technology (Information Technology)

Scheme of Courses (8th SEMESTER)

W.e.f Session 2009-10

Course No.	Subject	Teaching Schedule				Examination Schedule(Marks)				Duration of Exam (Hours)	Credits
		L	T	P	Tot	Th	Sess	P/VV	Tot		
	Open Elective-II	3	1	-	4	60	40	-	100	3	0.0
IT – 402	Statistical Models for Computer Science	3	1	-	4	60	40	-	100	3	3.5
IT – 404	Advanced Networks	3	1	-	4	60	40	-	100	3	3.5
	Departmental Elective III	3	1	-	4	60	40	-	100	3	3.5
IT – 412	Advanced Pr II			2	2	-	60	40	100	3	1.0
IT – 414	Major Project	-	-	11	11	-	60	40	100	3	14.0
IT – 416	General Fitness & Professional Aptitude	-	-	-	-	-	-	-	100	-	3.0
IT – 418	Seminar	-	1	-	1	-	100	-	100	-	1.5
Total		12	5	13	30				800		30.0

List of Courses for Elective III

1. **IT-422 Distributed Operating System**
2. **IT-424 E-Commerce**
3. **IT-426 Artificial Intelligence**
4. **IT-428 Embedded System**
5. **IT-430 E-Governance**
6. **IT-432 Natural Language Processing**
7. **IT-434 Multimedia Techniques**

Digital Electronics
IT-201

L	T		
3	1	Theory:	60
		Sessional:	40

1. Number Systems and Codes

Introduction to positional number system, signed magnitude numbers, floating point numbers, binary arithmetic: addition, subtraction, multiplication and division, Base conversion, conversion formulas with examples, one's and two's compliment arithmetic,

Computer codes – BCD codes, gray codes, excess-3 codes, parity checks, Hamming and alphanumeric codes.

2. Digital Logic Families

Qualitative introduction to digital ICs, TTL, Schottky TTL, ECL, MOS Logic, CMOS Logic, Tri-state logic: Characteristics and properties.

3. Combinational Logic Design

Introduction, standard representations for logical functions, Karnaugh map representation, simplification of logical functions using K-map, minimization of logical functions specified in minterms/maxterms or Truth Table,

minimization of logical functions not specified in minterms/maxterms, Don't care conditions, design examples, Ex-or and Ex-nor simplification of K-maps, five and six-variable K-maps, QM method, MEV method.

4. Combinational Logic Design using MSI circuits

Introduction, multiplexers and their use in combinational logic design, demultiplexers/decoders and their use in combinational logic design, adders and their use as subtractors, digital comparators, parity generators/checkers, code converters, priority encoders, 7-segment decoder/driver.

5. Synchronous Sequential Circuits

Introduction, FSM model, memory elements and their excitation functions. Synthesis of synchronous sequential circuits, capabilities and limitation of FSM, state equivalence and minimization, simplification of incompletely specified machines.

6. Asynchronous Sequential Circuits

Fundamental mode circuits synthesis, state assignment, pulse mode circuits.

7. A to D and D to A Converters

Introduction, Study of different types of analog to digital and digital to analog converters, their resolution, conversion time, sensitivity accuracy and other parameters. Study of some commercially available ADC and DAC chips.

BOOKS

1. R.P. Jain: Modern Digital Electronics, TMH.
2. Z Kohavi: Switching and Finite Automata Theory, TMH
3. M.M. Mano: Digital Logic Design, PHI.

Course Outcome (COs)	Description
CO1	To understand the concepts of basic gates, Number Systems and their Arithmetic, Computer Codes, digital logic families, SOP and POS simplifications.
CO2	To design MSI circuits.
CO3	Knowledge about the function of Flip-Flops, Counters, Registers.
CO4	Understanding the concepts of Sequential circuits.

Course Outcomes (COs)	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2		2					2	1	2
CO2		2	3	2		1			2			
CO3	2	2	2		2					2	2	2
CO4	1	3	3						1	1		

Object Oriented Programming using C++
IT-203

L	T		
		Theory:	60
3	1	Sessional:	40

1. Object Oriented Programming and Design

Review of Abstraction, Objects and other basics, Encapsulation, Information hiding, Method, Signature, Classes and Instances, Polymorphism, Inheritance, Exceptions and Exception Handling with reference to object modeling, Coupling and Cohesion in object oriented software. Object Oriented Design – Process, Exploration and Analysis. Detailed Study of object oriented design with reference to interactive graphics editor. Object Oriented Software Engineering.

2. C++ Programming Basics

Fundamentals: Variables and assignments, Input and Output, Data Types and Expressions, Flow of control, Subprograms: Top down design, Predefined functions, Programmer defined functions, Procedural abstractions, Local variables, Overloading function names, Operator overloading, Parameter passing, this pointer, Destructors, Copy constructors, Overloading the assignment operator, Virtual functions, Function Calling functions, Friend functions, Recursive function, Recursive member function.

3. C++ Object Oriented Concepts

Objects and Classes: Use of file for I/O, Formatting output with stream functions, Character I/O, Inheritance, Structures for diverse data, Structures as function arguments, Initializing structures, Defining classes and member functions, Public and private members, Constructors for initializations, Standard C++ classes, Derived classes, Flow of Control, Use of Boolean expressions, Multiway branches, Use and design of loops.

4. C++ Data Structures and Advanced Topics

Arrays – Programming with arrays, arrays of classes, arrays as function arguments, Strings, Multidimensional arrays, Arrays of strings, Pointers, Dynamic arrays, Classes and dynamic arrays, Base classes, access control, Templates – generic classes and functions, namespaces.

BOOKS

1. Herb Schildt: C++ - The Complete Reference, TMH, Delhi
2. Horstmann: Computing Concepts with C++ Essentials, John Wiley.
3. Mastering C++, K.R. Venugopal, TMH, New Delhi

Course Outcome (COs)	Description
CO1	Able to differentiate between structure oriented programming and object oriented programming and to specify simple abstract data types and design implementations
CO2	Recognize features of object oriented design such as encapsulation, polymorphism, inheritance and composition of systems based on object identity.
CO3	Able to use object oriented programming language like C++ and associated library to develop object oriented programs.
CO4	Able to understand and to use basic fundamentals of Java.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	3		1	1			1	1		1
CO2	3		2	1	1	1					1	1
CO3	3	3	1	3					1	1		
CO4				2	3					1		1

Data Structures
IT-205

L	T	Theory: 60
4	1	Sessional: 40

Note: All implementations in C language.

1. Introduction:

Introduction: Internal representation, integers, floating point numbers, packed decimal, characters, data types and data object, fundamentals of pointers in C, pointer declaration, passing pointer to functions, pointers and 1-d arrays, dynamic memory allocation, operation on pointers, pointers and 2-d arrays; Files and related operations in C.

2. Searching and Sorting Techniques

Efficiency of algorithms in terms of time and storage requirements, O-notation, Searching techniques: Linear and Binary, Sorting techniques: Selection, Bubble, Insertion, Mergesort, Quicksort and Radix sort

3. Simple Data Structures

Arrays: axiomatic definition of array, representation of array in storage, address mapping function, access table method of storage of arrays, sparse arrays, manipulation transpose, addition multiplication of sparse matrices, examples for application of stacks, expression evaluation, mazing problem, sequential allocation for stacks and queues; multiple stacks and queues.

4. Linked Data Structures

Linked Lists; definition, allocation for stacks and queues. Examples of linked lists, polynomial addition, comparison of sequential and linked allocation of storage; inversion, concatenation & copying of the lists.

Doubly Linked List: Definition of circular and doubly linked list, header node, insertion and deletion, sparse matrix, representation using doubly linked lists. Examples for application of doubly linked lists; dynamic storage management; node structures, routines for allocation and deallocation, generalized lists and recursive algorithms for copying and comparison of lists.

5. Advanced Data Structures

Trees, Basic concepts and definitions of a tree and binary tree and associated terminology, examples of tree structures. Binary trees traversal, Binary tree representation of trees, transformation of trees into binary trees, some more operations on binary trees. Graphs: Representation of graphs and their traverseral.

BOOKS

1. E Horowitz and S. Sahni: Fundamentals of Data Structures, Galgotia, 1999
2. R.B. Patel: Expert Data Structures in C, Khanna Publishers, 2001.
3. R.L. Kruse: Data Structures & Program Design in C, PHI.
4. D.F. Knuth: The art of Computer Programming Vol 1, Narosa Publications, 1985.
5. Byron S. Gottfried : Theory and Problems of Programming with C Language, Schaum Series, TMH, 1998.

Course Outcome (COs)	Description
CO1	Develop skill to identify and determine the usage of various data structures, operations, associated algorithms and implement their applications.
CO2	Apply knowledge of pointers, memory allocation and string handling for solving programming problems.
CO3	Understand the concept of trees and graphs, their implementation and applications.
CO4	Able to implement standard algorithms for searching and sorting.
CO5	Analyze efficiency of different algorithms using time and space complexity.

Course Outcomes (COs)	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		2	2	2	1	1			1		3
CO2	3		2	1	2		1	1			1	1
CO3	2	2	2	3	1				1	1	1	2
CO4	2	2	2	1						1	1	1
CO5	3	2	2	3	1	2	1			1	1	2

Web Site Design

IT-207

L	T		
		Theory:	60
3	1	Sessional:	40

1. Information Architecture

The Role of the Information Architect, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web Sites and Intranets, Creating Cohesive Organization Systems Designing Navigation Systems, Types of Navigation Systems, Integrated Navigation Elements, Remote Navigation Elements, Designing Elegant Navigation Systems, Searching Systems, Searching your Web Site, Designing the Search Interface, Indexing the Right Stuff, To Search or Not To Search, Grouping Content, Conceptual Design, High-Level Architecture Blueprints, Architectural Page Mockups, Design Sketches.

2. Dynamic HTML and Web Designing

HTML Basic Concepts, Good Web Design, Process of Web Publishing, Phases of Web Site development, Structure of HTML documents, HTML Elements – Core attributes, Language attributes, Core Events, Block Level Events, Text Level Events, Linking Basics, Linking in HTML, Images and Anchors, Anchor Attributes, Image Maps, Semantic Linking Meta Information, Image Preliminaries, Image Download Issues, Images as Buttons, Introduction to Layout: Backgrounds, Colors and Text, Fonts, Layout with Tables. Advanced Layout: Frames and Layers, HTML and other media types. Audio Support in Browsers, Video Support, Other binary Formats. Style Sheets, Positioning with Style sheets. Basic Interactivity and HTML: FORMS, Form Control, New and emerging Form Elements.

3. CGI using PERL

Introduction to CGI, Alternative Technologies, The Hypertext Transport Protocol, URLs, HTTP, Browser Requests, Server Responses, Proxies, Content Negotiation, The Common Gateway Interface, The CGI Environment, Environment Variables, CGI Output, Forms and CGI, Sending Data to the Server, Form Tags, Decoding Form Input, Architectural Guidelines, Coding Guidelines, Efficiency and Optimization.

4. Java Server Pages

Basics, Integrating Scripts in JSPs, JSP Objects and Components, configuring and troubleshooting, JSP: Request and response objects, Retrieving the contents of a an HTML form, Retrieving a Query String, Working with Beans, Cookies, Creating and Reading Cookies. Using Application Objects and Events.

5. XML

Relationship between HTML, SGML and XML, Basic XML, Valid Documents, Ways to use XML, XML for Data Files, Embedding XML into HTML documents, Converting XML to HTML for DISPLAY, Displaying XML using CSS and XSL, Rewriting HTML as XML, The future of XML.

BOOKS

1. Thomas A Powell, HTML The Complete Reference, Tata McGraw Hill Publications.
2. Scott Guelich, Shishir Gundavaram, Gunther Birzniek; CGI Programming with Perl 2/e, O'Reilly
3. Doug Tidwell, James Snell, Pavel Kulchenko; Programming Web Services with SOAP, O' Reilly
4. Pardi, XML in Action, Web Technology, PHI.
5. Yong, XML Step by Step, PHI.
6. Aaron Weiss, Rebecca Taply, Kim Daniels, Stuven Mulder, Jeff Kaneshki, Web Authoring Desk Reference, Techmedia Publications.

Course Outcome (COs)	Description
CO1	Understand basic principles of web site design, considering the information architecture.
CO2	Incorporate best practices in navigation, usability in website design
CO3	Design of website adhering to current web standards (HTML, XML, CSS)
CO4	Learning various scripting languages to create interactive components in web pages.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	1									1
CO2	2	2	1	1	1	1		2				2
CO3	2	2	2	1	2			1	1		1	1
CO4	3	2	2	1	2						1	1

Program Design & File Structures
IT-209

L	T		
3	1	Theory: 60	
		Sessional:	40

1. Introduction to File Systems

Characteristics and working of magnetic tapes, magnetic disks, optical disks; File organizations, file operations, file systems, file directories, device control, channel and buffer management, Sequential File Organization – Creating, retrieving and updating sequential files & their performance; merging – natural, balanced, polyphase, cascade and their performance; relative file organization – definition, addressing techniques, problem of collision and its solutions, performance; indexed sequential file organization – definition, application, implementation strategies; multi-key file organization – multi-key access, inverted file organization, multi-list file organization.

2. File Organizations & Indexes

Cost model, comparison of 3 file organizations, overview & properties of indexes; Tree-structured Indexes- ISAM, B+ trees: format & operations, B+ trees in practice; Hash based Indexing- static hashing, extendible hashing, linear hashing, comparisons; Using B+ trees for sorting.

BOOKS

1. M.E. Loomis: Data Management and File Structures, 2nd Ed. PHI. 1997.
2. R Ramkrishnan, J. Geharke, "Data Base Management Systems", 2nd Ed, TMH, 2000.

Course Outcome (COs)	Description
CO1	Able to distinguish between amateur and professional programming and develop professional approach to programming.
CO2	Ability to handle large, complex problems through decomposition.
CO3	Ability to select appropriate file organization and apply the appropriate merging techniques while external sorting, if needed.
CO4	Able to understand the characteristics and working of various inputs and output devices of computer.

Course Outcomes (COs)	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	2	2				3	2	2	
CO2	2	3	3	2	3						3	3
CO3	3	2	1	2								1
CO4	3	2	1	1	2		1					

Digital Electronics (Pr.)
IT-211

L	T	P		
-	-	2	Practical:	40
			Sessional:	60

List of Practical

1. To study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, & EX-NOR).
2. To design and verify a half and full adder circuits.
3. To design a 4 bit adder/subtract using IC 7483.
4. To design and implement a 4:1 multiplexer.
5. To design and implement a 1:4 demultiplexer.
6. Verify the truth table of a 4-bit comparator using IC 7485.
7. To design and verify a 2:4 decoder.
8. To design and implement a 2:4 encoder.
9. To verify the operation of a D and JK flip-flop using ICs 7474 AND 7473.
10. To design and verify the operation of RS, T, D, and JK flip-flops using logic gates.
11. To verify the operation of a Mod-10 counter.
12. To design and implement the operation of a Mod-16 counter using JK flip-flops
13. To design and implement a Mod-10 counter using JK flip flops and logic gates.
14. To verify the operation of a 4 bit shift register using IC 7495.
15. To design and verify the operation of a 4-bit shift left register using D flip-flops.
16. To design and verify the operation of a 4-bit shift right register using D flip-flop.

Course Outcome (COs)	Description
CO1	Able to design, test and analyze simple circuits using different types of gates,flip flops, counters & registers.
CO2	To develop skill to build, and troubleshoot digital circuits
CO3	Ability to identify basic requirements for a design application and propose a cost effective solution
CO4	The ability to understand, and analyze various combinational and sequential circuits.

Course Outcomes (COs)	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	3	1	2	1	1		2		1	2
CO2	3		2	2	2	1			1			3
CO3	1	3	2	2		2	2		2	2	2	1
CO4	2	3	2	1	1				1		2	

Object Oriented Programming using C++ (P)

IT-213

L	T	P		
			Practical:	40
-	-	2	Sessional:	60

List of Practical

1. (a) Model a geometric point to find distance between two points.
   (b) Model complex numbers and their operations.

2. Describe a class called TOLL- BOOTH with the following data items
   unsigned int - to hold the number of cars passing through the booth,
   double - to hold the total amount collected.
   Include the following member functions:
   * a constructor that sets both the data fields to zero.
   *PAYINGCAR( ) that increases the numbers of cars by one and
   increase the total amount by 2.50.
   *NOPAYING( ) that increases the number of cars but keeps the total amount unchanged.
   *DISPLAY( ) that displays both the total number of cars passing and the total number of amount collected.

   Write main( ) to test the class thoroughly.

3. Create a class rational which represents a numerical value by two double values- NUMERATOR and DENOMIATOR . Include the following public member functions:
* constructor with no arguments (default)
* constructor with two arguments.
* void reduce () that reduces the rational number by eliminating the highest common factor between the numerator and denominator.
* overload + operator to add two rational numbers.
* overload >> operator to enable input through cin.
* overload << operator to enable output through cout.

Write a main () to test all the functions in the class .

4. Consider the following class
   definition class father {
   protected : int age;

   public;
   father (int x){age =x;}
   virtual void iam()

{cout <<"I AM THE FATHER, my age is :"<<age<<end1;}
};

Derive the two classes son and daughter from the above class and for each, define iam() to write out similar but appropriate messages. You should also define suitable constructors for these classes.

Now, write a main () that creates objects of the three classes and then calls iam() for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam() through the pointer to demonstrate polymorphism in action.

5. A thermostat is a device that keeps a system at a constants temperature. It behaves like a temperature gauge that is capable of getting the current temperature from the system. It is also a switch that can be turned "on" and "off". The thermostat monitors the temp. in the following manner :

   if the current temp. falls below 95% of the required temp., it turns itself "on". On the other hand, if the current temp. exceeds 1.05 of the required temp. ,it turns itself "off" .In all other cases ,its on-off status remain unchanged.

   Implement classes for temp. gauge and switch(named switch) with suitable data and member functions. The temp. gauge class must have a member function get_temp() that will pretend to get the current temp. of the system by actually reading it from the keyboard.

   Now, implement thermostat class in both the following ways:

a) Develop a class called thermostat that include objects of temp. gauge and switch as its member (aggregation).
b) Develop a class called thermostat that inherits the data functions of temp. gauge and Switch (multiple inheritances).

   Write main ( ) to test all the features of above-mentioned classes.

6. Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll no., name (a string of 30 or lesser no. of characters) and marks.

7. Using the file created in problem 6, write a program to display the roll no. and names of the students who have passed (has obtained 50 or more).

8. You are to create a file containing n records. Each record relates to a historical event and the year in which the event took place

   Some examples are: India Wins
   Freedom 1947 Amartya Sen Gets
   Nobel 1998 First World War
   Begins 1914

   The data should be read from terminal while creating the file.

9. A hospital wants to create a database regarding its indoor patients. The information to store include

(a) Name of the patient
(b) Date of admission
(c) Disease
(d) Date of discharge

   Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the databases. Create a derived class to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).

10. Define a class to store the time at a point. The data members should include hr., min., and sec. to store hours, minutes and seconds. The member functions should include functions for reading the time and

displaying the same. Add a friend function to add two times. Write a program, using the above declaration, to read two times and add them.

11. Write a program to read two matrices and find their product. Use operator overloading so that the statement for multiplying the matrices may be written as $Z = X * Y$ where X , Y and Z are matrices.

12. Write a program to read a number and display its square, square root, cube and cube root. Use a virtual function to display any one of the above.

13. Make a class **Employee** with a name and salary. Make a class **Manager** inherit from **Employee**. Add an instance variable, named department, of type String. Supply a method to **toString** that prints the manager's name, department and salary. Make a class **Executive** inherit from **Manager**. Supply a method **toString** that prints the string **"Executive"** followed by the information stored in the **Manager** superclass object. Supply a test program that tests these classes and functions.

14. Write a superclass **Worker** and subclass **HourlyWorker** and **SalariedWorker**. Every worker has a name and a salary rate. Write a method **computePay(int hours)** that computes the weekly pay for every worker. An hourly worker gets paid the hourly wage for the actual number of hours worked, if **hours** is at most 40. If the hourly worker worked more than 40 hours, the excess is paid at time and a half. The salaried worker gets paid the hourly wage for 40 hours, no matter what the actual number of hours is. Write a static method that uses polymorphism to compute the pay of any **Worker.** Supply a test program that tests these classes and functions.

Course Outcome (COs)	Description
CO1	To be able to apply an object oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
CO2	To be able to reuse the code and write the classes which work like built-in types.
CO3	To be able to design applications which are easier to debug, maintain and extend.
CO4	To be able to apply object-oriented concepts in real world applications.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2		2							1
CO2	1	2	2	3		1					1	
CO3		3	3		3					1	1	
CO4	2	2	1	2	2	1			1	1		1

Data Structures (Pr.)

IT-215

L	T	P		
-	-	3	Practical:	40
			Sessional:	60

List of Practical

1. Define two strings as arrays. Read them using %s. Using pointers, concatenate them without using string.h.
2. Define a pointer to an integer; read a list of n numbers using dynamic memory allocation and find average of these numbers.
3. Create a file containing 26 alphabets(A to Z) in separate lines.
4. Copy a file to another. Source file name and destination file name are input from the user.
5. Write a program for binary search (successful and unsuccessful both).
6. Sort n numbers using quick/merge/selection sort. Also count the number of exchanges in each case.
7. Write a program for expression evaluation using stacks.
8. Write a program for infix to postfix conversion.
9. Create a singly linked list and reverse it in the same list.
10. Write a program for a doubly linked list giving following option, insertion, deletion, retrieval,
11. Write a program to implement queues using linked list with option; list of elements in queue, insertion, and deletion.
12. Write a program to implement stacks using linked list with options push and pop.
13. Write a program for multiplication of two polynomials using linked list.
14. Write a program to implement binary trees. Depending on the choice, inorder/ preorder/ postorder traversal is done.
15. Implement heap sort. Show the contents of heap after each adjustment of element i.e. n outputs should be printed if list has n elements.

Course Outcome (COs)	Description
CO1	Apply the knowledge of various data structures and operations
CO2	To design various operations for solving programming real-world problems
CO3	To understand the concept of trees and graphs, their implementation and applications
CO4	Able to implement standard algorithms for searching and sorting
CO5	Analyze efficiency of different algorithms using time and space complexity

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		2	2	2	1	1			1		3
CO2	3		2	1	2		1	1			1	1
CO3	2	2	2	3	1				1	1	1	2
CO4	2	2	2	1						1	1	1
CO5	3	2	2	3	1	2	1			1	1	2

Web Site Design (Pr.)

IT-217

L	T	P		
-	-	2	Practical:	40
			Sessional:	60

List of Practical

1. Chalk out the storyboard and design of Dairy Food Limited. As the name reflects your site provides dairy products and aims at opening an online store. Your storyboard should cover all the features that you plan to have on the site.
2. Create your own page with your favorite hobbies.
3. Create a Menu or a Table of content web page. Each menu item or section of the table of content should load a different web page. For example, if the user clicks on Menu one or section 1 then the link should take him to respective menu html. Or section and so on.
4. Create a web site for your College,
5. Create a frameset that is divided into three sections. The frameset should have three zones.
   - the topmost section of the frameset should take up about just 15% of the browser window. Name this frame title.
   - The middle section should be 70% of the browser window. Name this frame title.
   - The lower most sections should also be about 15% of the browser window. Name this section as menu. Create pages for each section. For the lowermost section, create page that loads the content into the middle section. The topmost section should contain a page describing the web page itself.
6. Create a web page, which displays the map of your Country Link, each city/state on the image using image map, such that the respective HTML page of the city/state is displayed when the user selects an area.
7. Add the tickertape applet to your page by customizing it for the following settings:
   - Increase the count by one.
   - Accordingly update the message count.
   - Change the text color to (237,192,171)
   - Experiment with changing the scrolling speed.
   - Customize the message text as per your page requirement.
8. Incorporate a quest book into the Dairy Food Webpage and use Java Script to build validations into the form.
9. Use Style sheet to modify the following:
   - Change background to modify the following.
   - Change font, type, face and color.
   - Align Text.
   - Remove underlines from hyperlinks.
10. Use any Web Server to set up your website.

Course Outcome (COs)	Description
CO1	Design of web pages using HTML tags and CSS
CO2	Implementation of scripting language, like Javascript
CO3	Implementation of scripting language, like JSP
CO4	Implementation of scripting language, like CGI-PERL
CO5	Creation of sophisticated web applications

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	2	1	1							1
CO2	2	2	2	1	2						1	2
CO3	3	3	2	2	2			1	2		2	1
CO4	2	2	2	1	2						1	2
CO5	2	2	2	1	2						1	2

Program Design and File Structures (P)

IT-219

L	T	P		
-	-	2	Practical:	40
			Sessional:	60

Note: Implement following programs in C language.

1. Modular program development of a simple text based calculator.
2. Modify above design to develop scientific calculator.
3. Computation of ${}^{n}C_{m}$ using Recursion.
4. Generate Fibonacci series using recursion.
5. Implement natural merge and polyphase merge.
6. Implement a GUI/Mouse driven simple calculator.

Course Outcome (COs)	Description
CO1	Able to understand the concept of modular program development and design simple and scientific calculator in C
CO2	Design and development of recursion based program
CO3	Design programs involving natural and polyphase merge
CO4	Use different graphical based programming to create a simple calculator

Course Outcomes (COs)	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	1							2
CO2	2	2	2	2	1							1
CO3	2	2	2	2	1							1
CO 4	2	3	2	1	1							

Computer Organization and Architecture

IT-202

L	T		
3	1	Theory:	60
		Sessional:	40

1. **Introduction**
   Basic Machine Principle, Structure and representation of real world data, Von-Newman Model and stored program concept, Subroutine, Branching & Macro facility.
2. **Processor Design**
   Processor Organization, Information representation and Number format, Instruction cycle and Instruction format, Addressing modes, Arithmetic operation, timed point addition, subtraction, multiplication and division, ALU design and floating point arithmetic, Parallel processing – Performance consideration, Pipeline processor and Multiunit processor.
3. **Control Design**
   Instruction sequencing and Interpretation, Hardware Control design method, Multiplier control unit and CPU control unit, Microprogrammed Control, Minimizing Instruction Size, Microprogrammed computer.
4. **Memory organization**
   Memory device characteristic, Random access and serial access memories, Virtual memory – memory hierarchies, Main Memory allocation & replacement policies, Segments, pages and file organization, High speed memories – Interlocked, cache and associative memory.
5. **System Organization**
   Local and long distance communication, Programmed I/O, DMA and interrupts, I/O processors & CPU – I/O interaction, Multiprocessor Introduction.

BOOKS

1. J.P. Hayes: Computer Architecture and Organization, 3rd Ed. TMH, 1999.
2. C.W. Gear: Computer organization and Programming, TMH.
3. T.C. Bartee: Digital Computer Fundamental, TMH.
4. M.M. Mano: Computer System Architecture, PHI.
5. A. S. Tanenbaum: Computer System Organization, PHI.

Course Outcome (COs)	Description
CO1	To understand basic machine principles, concept of Newman Model and stored program.
CO2	To perform computer arithmetic operations, control unit operation and to analyze Pipeline processor and Multiunit processor.
CO3	To design and organize system and ways to deal with interrupts.
CO4	To access and organize various types of Memories and mapping process.

Course Outcomes (COs)	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	2	2	2				3	2	2	
CO2	2	3	3	2	3						3	3
CO3	3	2	1	2								1
CO 4	3	2	1	1	2		1					

Unix and Linux Programming
IT-204

L	T	
3	1	60
		40

End Semester:
Mid Semester:

1. Linux Startup

User accounts, accessing Linux – starting and shutting processes, Logging in and Logging out, Command line, simple commands

2. Shell Programming

Unix file system: Linux/Unix files, inodes and structure and file system related commands, Shell as command processor, shell variables, creating command substitution, scripts, functions, conditionals, loops, customizing environment

3. Regular Expressions and Filters

Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to egrep, sed, programming with awk and perl.

4. The C Environment

The C compiler, vi editor, compiler options, managing projects, memory management, use of makefiles, dependency calculations, memory management – dynamic and static memory, building and using static and dynamic libraries, using ldd, soname, dynamic loader, debugging with gdb

5. Processes in Linux

Processes, starting and stopping processes, initialization processes, rc and init files, job control – at, batch, cron, time, network files, security, privileges, authentication, password administration, archiving, Signals and signal handlers, Linux I/O system

BOOKS

1. John Goerzen: Linux Programming Bible, IDG Books, New Delhi, 2000.
2. Sumitabha Das: Your Unix – The Ultimate Guide, TMH, 2000.
3. Mathew: Professional Linux Programming, vol.1 & 2, Wrox-Shroff, 2001.
4. Welsh & Kaufmann: Running Linux, O'Reiley & Associates, 2000.

Course Outcome (COs)	Description
CO1	Ability to install the Linux operating system, hands on with simple commands, analysis of vi editor, environment variable settings etc.
CO2	Able to develop a C program. Apply the concepts of file handling, filters, and regular expression using shell programming.
CO3	Capable to develop and implement grep, awk, and perl scripts.
CO4	Ability to develop shell script program that handle processes.
CO5	Apply the concepts of debugging and execute shell programming. Installation of Linux package into the operating system.

Course Outcomes (COs)	Programme Outcomes(POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1			2							3	
CO2	3	3	3	2								
CO3	1	3	1	2								
CO4	2	3	2	2					3	2		
CO5		2		3				2	1		3	

Database Management Systems
IT-206

L	T	Theory: 60
3	1	Sessional: 40

1. Basic Concepts

What is database system, why database, Data independence, 3 levels of architecture; external level, conceptual level, internal level, mapping DBA, DBMS, organization of databases, components of DBMS, Data Models, Relational Models, Networks data model, Hierarchical Model, semantic data model.

2. Relational Model

Introduction – Relational Model, base tables & views, relations, domains, candidate keys, primary key, alternate keys, foreign key, Integrity rules, relational Operators – relational algebra, relational calculus, Data Base Design – Introduction, Basic Definitions, Non-loss decomposition and functional dependencies, 1NF, 2NF, 3NF, BCNF, MVD & 4NF, JD & 5NF, Normalization procedure, other normal forms.

3. Concurrency

Transaction concept, transaction state, concurrent executions, serializability lock based protocols, timestamp based protocols, validation based protocols, deadlock handling.

4. Distributed Data Bases

Introduction, fundamental principles, objectives, Problems of distributed processing-query processing, catalog management, updates propagation, recovery control, and concurrency control.

BOOKS

1. C.J. Date: An Introduction to Database systems 7th Ed. Addison Wesley, Indian Edition, 2000.
2. A.K. Majumdar and Bhattacharyya: Database Management Systems, THM, 1996.
3. A Silberschatz, H.F. Korth & S. Sudarshan: Data Base System Concepts, TMH, 1997

Course Outcome (COs)	Description
CO1	Able to understand the basic concepts, principles and applications of database system.
CO2	Able to discuss the components of DBMS, data models, Relational models.
CO3	Able to use knowledge to find the functional dependencies and differentiate between different normal forms.
CO4	Able to execute transaction concepts and concurrency protocols
CO5	Able to Design the databases system.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	3	1		1			1	1	2	1
CO2	1	2	2	1	3							3
CO3	2	3	2	2								2
CO4	1	1	2	1	1	2		1	1		1	2
CO5	1	1	1	3								

Java Programming

IT-208

L	T	End Semester: 60
3	1	Mid Semester: 40

Unit: 1

An overview of Java: - Java features how java differs from C & C++, data types, constants & variables, operators & expressions, control structure in java, classes, objects & methods, arrays, strings & vectors introduction to Java Design patterns. Overview of UML use in program design.

Unit: 2

Interfaces & Packages: - Defining, extending, implementing interfaces, accessing interface variables, Packages: - Introduction using system package, accessing a package, using a package, adding a class to a package & hiding classes, Introduction to multithread programming.

Unit: 3

Applet Programming:- Applet fundamentals, life cycle of applet, creating an executable applet, applet tags, running the applet & passing parameters to applet. Introduction to AWT with windows.

Unit: 4

Software development using Java beans:- Introduction to Java beans, introspection, Introduction to swings, Japplet, Jframe & Jcomponent, Buttons, Introduction to servlet :- Life cycle of a servlet, tomcat for a servlet development.

BOOKS

1. Ivor Horton Beginning Java 2 – JDK 5 Edition, Wiley-India
2. Mark Grand Patterns in Java Vol. 1-3, Wiley-India
3. Steve Holzner Java 2 (JDK 5 Edition) Black Book Wiley-India
4. B. Eckel Thinking in JAVA, Pearson Education.
5. Deitel & Deitel How to Program JAVA. Pearson Education.

Course Outcomes (COs)	Description
CO1	Able to understand and analyse the concept of objects and object oriented programming.
CO2	Able to apply knowledge of Java to solve complex problems involving package, interfaces, multithreading.
CO3	Able to design user interface using AWT/Swings and Applets.
CO4	Able to create web application using servlets.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**
CO1	2	2	3		1						1	1
CO2	2	2	3		1							
CO3		2	3									
CO4	1	2	3	2	2							

B Tech 4th Semester (Information Technology)

MAT-206 Mathematics –V

L	T	P
3	1	

PART –A

1. Finite-Differences

Finite differences, Difference operators, Newton's forward and backward Interpolation formulae, Bessel's formulae and Stirling's Formulae, Lagrange's interpolation, formula for unequal interals, Numerical differentiation, Numerical integration: Trapezoidal rule, Simpson's1/3 rule.

2. Differences Equations

Formation of difference equations, Solution of homogenous and non-homogenous with constant coefficients linear difference equations.

3. Numerical solution of ordinary differential equations

Picard's method, Euler's method, Runga Kutta method, Milne's predictor-corrector method.

PART-B

4. Statistical Method:

Binomial distribution, Poisson distribution and Normal distribution with their properties and application.

5. Operational Research:

Linear programming problems formulation, solving linear programming problems using i) Graphical Methods ii) Simplex Method iii) Dual Simplex Method

PART-C

6. Sets and Propositions

Introduction, Combination of sets, Finite and Infinite sets, Uncountably Infinite Sets, Mathematical Induction, Principle of Inclusion and Exclusion, Multisets, Properties of Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations, Functions and Pigeonhole Principle, Propositions.

7. Graphs and Planar Graphs

Introduction, Basic Terminology, Multigraphs and Weighted Graphs, Paths and Circuits, Shortest Paths in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Planar Graphs, Trees,

Rooted Trees, Path Lengths in Rooted Trees, Binary Search Trees, Spanning Trees And Cut-sets, Minimum Spanning Trees. Rcurrence Relations, Linear Recurrence Relations with Constant Coefficients.

NOTE TO PAPER SETTER:
Set 8 questions in all, 2 from part A, 2 from part B, 4 from part C. Candidates have to attempt 5 questions selecting atleast 1 question from each part.

BOOKS

1. Numerical Mathematics Analysis : IB Scarborough
2. Numerical Methods for Scientific & Engineering computation : M.K. Jain, S.R.K Iyengar, R.K. Jain
3. Operational Mathematics : : R.Charchill
4. C.L. Liu: : Elements of Discrete Mathematics
5. Kenneth Kalmanson: An Introduction to Discrete Mathematics and its Applications, Addison Wesley Publishing Co., 1986.
6. J.P. Tremblay : Discrete Mathematics Structures with Application to Computer Science, McGraw Hill, N.Y., 1977.

Operating Systems

IT – 212

L	T	Theory: 60
3	1	Mid Sem: 40

1. File & CPU management

Operating system functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service system calls, system programs, Interrupt mechanisms, concept of threading.

File Systems: Functions of the system, File access and allocation methods, Directory Systems: Structured Organization, directory and file protection mechanisms, implementation issues; hierarchy of file and device management.

CPU Scheduling: Levels of Scheduling, Comparative study of scheduling algorithms, multiple processor scheduling.

2. Storage & Device Management

Storage Management: Storage allocation methods: Single contiguous allocation, multiple contiguous allocation, Paging, Segmentation combination of Paging and Segmentation, Virtual memory concepts, Demand Paging, Page replacement Algorithms, Thrashing,

Device Management: Hardware Organization, Device scheduling policies & I/O management.

Protection: Mechanisms and Policies, Implementation.

3. Deadlocks & Concurrency Control

Deadlock: Deadlock characterization, Deadlock prevention and avoidance, Deadlock detection and recovery, practical considerations.

Concurrent Processes: Critical section problem, Semaphores, Classical process coordination problems and their solutions, Interprocess Communications, multithreading.

BOOKS

1. Peterson, J.L. & Silberschatz, A.: Operating System Concepts, Addison, Wesley-Reading.
2. Brinch, Hansen: Operating System Principles, Prentice Hall of India.
3. Haberman, A.N.: Introduction to Operating System Design Galgotia Publication, New Delhi.
4. Tanenbaum, A.S.: Operating Systems.
5. Hansen, P.B.: Architecture of Concurrent Programs, PHI.
6. Shaw, A.C.: Logic Design of Operating Systems, PHI.

Course Outcomes (COs)	Description
CO1	Understanding of the inherent mechanism involved in functioning of an operating system.
CO2	Ability to analyse various scheduling and synchronisation techniques.
CO3	Knowledge of file systems its implementation and protection.
CO4	Analysis of memory and device management methodology.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	3			1						3
CO2	2	3	3	2							2	
CO3	1		2	1					1			
CO4	2	3	2	2			1					

Unix and Linux Programming (Pr.)
IT-214

P

2 End Semester: 40

Mid Semester: 60

1. Familiarize with Unix/Linux logging/logout and simple commands.
2. Familiarize with vi editor and Linux GUIs.
3. Using Bash shell develop simple shell programs.
4. Develop advanced shell programs using awk and grep.
5. Compile and debug various C programs using different options.
6. Learning of installation and upgradation of Linux operating system.
7. Install Linux on a PC having some other previously installed operating system. All OSs should be usable.
8. As supervisor create and maintain user accounts, learn package installation, taking backups, creation of scripts for file and user management, creation of startup and shutdown scripts using at, cron etc.

Course Outcomes (COs)	Description
CO1	Ability to install the Linux operating system, hands on with simple commands, analysis of vi editors, environment variable settings etc.
CO2	Able to develop a C program. Apply the concepts of file handling, filters, and regular expression using shell programming.
CO3	Capable to develop and implement grep, awk, and perl scripts.
CO4	Ability to develop shell script program that handle processes.
CO5	Apply the concepts of debugging and execute shell programming. Installation of Linux package into the operating system.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1			2							3	
CO2	3	3	3	2								
CO3	1	3	1	2								
CO4	2	3	2	2					3	2		
CO5		2		3				2	1		3	

Database Management Systems Lab
IT-216

P

3 Practical: 40

Sessional: 60

1. Create a database (database 1) for your class group containing information - roll no., name, group, branch etc. about students.

2. Create a database (database 2) for the employees of an organization and edit it using various available options.
3. Index the database created in problem 3 using various conditions.

4. Use various select queries to search the database for both the databases using different conditions.

5. Generate report for both the databases.

6. Practice various prompt commands like create, select etc.
   Application Programs:

7. Write a program to list out all the information about students getting marks than 70 % using loop structure.

8. Write a program to enter the data into database 2.

9. Write a program to modify the designation of all employees of database 2 for whom the date of joining is before Jan. 10, 2002.

10. Write a program to display 5th record from both the databases.

11. Write a program to delete the records of the students who are getting marks less than 40 %.

12. Develop an MIS for an XYZ Paper Mill to automate its
    i) Inventory
    ii) Purchase
    iii) Sales
    iv) Payroll
    v) Annual production report.

Course Outcomes (COs)	Description
CO1	Leaning the installation of DBMS and other related activities
CO2	Creating small databases using SQL
CO3	Writing variety of queries for retrieval of data from database
CO4	Learning to connect database with application

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2		2							1
CO2	1	2	2	3		1					1	
CO3		3	3		3	0				1	1	
CO4	2	2	1	2	2	1			1	1		1

Java Programming (Pr.)

IT-218

P

2 Practical: 40

Sessional: 60

Note: All programs will be performed using Eclipse or Netbeans IDE. Java Program Development through Patterns and OO Techniques should be the target

1. Write a program to calculate the sum of following series:-

   1+1/2+1/3+----------+1/n.

   Where n should be given interactively through keyboard.

2. Write a program to print the following o/p:-1

   2 2

   3 3 3

   4 4 4 4

   5 5 5 5 5

3. The class nesting defines one constructor and two methods, namely largest () and display() , The method display() calls the method largest()to determine the largest of two numbers and then display the result.
4. Create a classroom and extend it to another class bedroom. The subclass bedroom now includes three instant variables, namely length, breadth and height. And two methods, area () and volume (). Calculate the area and volume of objects of the bedroom class.

5. Write a program to find the area and volume of circle and cylinder using shape interface.

6. Consider a superclass figure that stores the dimensions of two-dimensional object. It also defines a method called area () that computes area of object. The program derives two subclasses from class figure. The first is rectangle and second is triangle. Each of these two classes overrides over area ().

   Calculate the area of rectangle and triangle.

7. Make a class employee with a name and salary. Make a class manager inherits from employee. Add an instance variable, named department, of type string. Supply a method to string that prints the manager's name. Supply a method to string that that prints the string "executive" followed by the information stored in the manager superclass object. Supply a test program that test these classes and methods.

8. Create an applet with a text field and three buttons. When you press each button, make some different text appear in the text field. Add a check box to the applet created, capture the event, and insert different text into text field.

9. Create an applet with a button and a text field. Write a handleEvent () so that if the button has the focus, character typed into it will appear in the text field.

10. Create your own JavaBeans called valve that contains two properties: a Boolean called "on" and an integer called "Level". Create a manifest file, use jar to package your Bean, then load it into the beanbox or into your own Bean enabled program builder tool e.g. BDK so that you can test it.

BOOKS:

1. Mark Grand — Patterns in Java Vol. 1-3, Wiley-India.
2. Ivor Horton — Beginning Java 2 – JDK 5 Edition, Wiley-India
3. Steve Holzner — Java 2 (JDK 5 Edition) Black Book, Wiley-India
4. Herb Schildt — Java 2 The Complete Reference

Course Outcomes (COs)	Description
CO1	Configuring the environment to write/develop java programs for simple real world problems. Understanding the basic constructs of the java programming language.
CO2	Writing java programs to solve real world problems by using java language construct such as arrays, program arguments, inheritance, interfaces, strings, packages, I/O packages etc.
CO3	Designing the user interface for end users with AWT/Swing and adding multi-tasking capabilities to the programs via multithreading.
CO4	Enhancing/Redesigning the software development by specific design patterns based on the requirements such as Singleton, Factory etc. Designing a simple web application using servlet technology.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	2		3							
CO2	2	2	3		1							
CO3		2	3									
CO4	1	3	3	2	2							

B.Tech 4th Semester (Information Technology)

IT-222
Operating System (Pr.)

1. Study of H/W & S/W requirement of different operating system.

2. Implementation of contiguous, linked and indirect allocation strategies assuming randomly generated free space list

3. Implementation of worst, best & first fit for contiguous allocation assuming randomly generated free space list.

4. Implementation of Compaction for the continually changing memory layout & calculate total movement of data.

5. Calculation of external & Internal fragmentation for different program & for different page size.

6. Implementation of resource allocation graph.

7. Implementation of Banker's algorithm.

8. Conversion of response allocation graph to wait for graph

9. Implementation of Bernstein's condition for concurrency

10. Implementation of Fork & Join Construct.

11. Implementation of "Semaphore" for concurrency.

12. Study of system calls and various OS management services in Unix/Linux OS and their implementation.

Course Outcomes (COs)	Description
CO1	Detail study of hardware and software requirements of different operating systems
CO2	Design and development of contiguous, linked and indirect allocation strategies
CO3	Design programs involving worst fit, best fit and first fit.
CO4	Design and developments of programs involving fragmentation, compaction, resource allocation graph, modelling condition for concurrency

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	1							2
CO2	2	2	2	2	1							1
CO3	2	2	2	2	1							1
CO4	2	3	2	1	1							

B Tech 5th Semester (Information Technology)

IT-301 Design and Analysis of Algorithms

L	T	P
4	1	

1. Basics of Algorithm Analysis & Design

Stacks, queues, trees, heaps, sets and graphs. Algorithm Definition, Analyzing algorithms, order arithmetic, time and space complexity. [1,2]

2. Algorithm Design Techniques

Divide and Conquer: general method, merge sort, selection problem, other applications of divide & conquer [1]

3. Greedy method

Job Sequencing, Knapsack problem, optimal merge patterns, minimum spanning trees & other applications of Greedy method [1]

4. Dynamic Programming

Use of table instead of recursion, all pair shortest Path, 0/1 knapsack, optimal binary search tree, traveling salesperson problem & other applications of Dynamic programming [1]

5. Search and Traversal

Search techniques: breadth first search, depth first search, code optimization, Internal and External sorting, searching and merging techniques [1]

6. Backtracking

8 queens problem, sum of subsets, graph coloring, knapsack problem & other applications of Backtracking [1]

7. Branch and Bound

0/1 knapsack problem, traveling salesperson problem. Lower Bound Theory: Comparison trees for sorting and searching, Oracles and adversary arguments, techniques for algebraic problems. [1]

8. Problem clauses

NP, NP- Hard and NP-complete, deterministic and non-deterministic polynomial time algorithm approximation and algorithm for some NP complete problems. Introduction to parallel algorithms, Genetic algorithms, intelligent algorithms [1,2]

BOOKS:

1. Horowitz, Ellis and Sahni, Sartaj, Fundamentals of Computer Algorithms, 2/e Galgotia Publications.
2. Cormen, Leiserson and Rivest, Introduction to Algorithms, 2/e, PHI.
3. Aho, Hopcroft, and Ullman, The Design and Analysis of Computer Algorithms, 2/e Addison Wesley.

Course Outcomes (COs)	Description
CO1	Gain insight about design and analysis of standard searching and sorting algorithms. Learn various algorithm Analysis techniques.
CO2	Learn divide and conquer, Dynamic programming, Greedy and backtracking paradigms and understand when an algorithmic design situation calls for them.
CO3	Able to compare between different data structures i.e., trees, heaps etc. also, pick an appropriate data structure for a design situation.
CO4	Explain the major graph algorithms and their analysis. Employ graphs to model engineering problems.
CO5	Understand NP completeness and understand difference between NP-Hard & NP-complete problems.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	2	2	1	1	1	1		3	2
CO2	3	3	3	3	2	1	2	1			3	2
CO3	2	3	3	2	2	1			1	1	2	1
CO4	3	3	3	3	3	1					2	
CO5	2	2	2	3	2	1					3	

B Tech 5th Semester (Information Technology)

IT-303 Software Engineering

L	T	P
3	1	

1. Introduction
Introduction to Software crisis & Software processes; Software life cycle models – Build & Fix, waterfall, incremental, prototype evolutionary, spiral model, Unified process. [1]

2. Requirement Analysis & Specifications
Requirements engineering, types of requirements, feasibility study, requirement elicitation, analysis, documentation, validation, management, case study [1]

3. Software Project Planning
Size estimation, cost estimation, COCOMO, COCOMO II, Putnam model, risk management [1]

4. Software Design
Design, modularity, strategy of design, function oriented design, object oriented design. [1]

5. Software Metrics
Introduction, token count, data structure metrics, IF metrics, O-O metrics, size metrics, data structure metrics, information flow metrics, entropy-based measures, metric analysis. [1]

6. Software Reliability
Basic concepts, software quality, reliability models, Capability Maturity Models, ISO 9000 [1]

7. Software Testing
Introduction, functional testing, structural testing, levels of testing, debugging, testing tools. [1]

8. Software Maintenance
Introduction, types of maintenance, maintenance models, reverse engineering, re-engineering. [1]

BOOKS:

1. K.K.Aggarwal, Yogesh Singh, Software Engineering, New Age International Ltd, 3rd Ed, 2008.
2. Pankaj Jalote, An Integrated Approach to Software Engineering 3rd Ed, Narosa Publishing, 2005.
3. R.S. Pressman, Software Engineering – A Practitioner's Approach, 6th Ed, TMH, 2007.
4. Ian Sommerville, Software Engineering, 5th Ed., Addison Wesley, 2006.

Course Outcomes (COs)	Description
CO1	Analyze software crises and apply appropriate software process models to combat crises .
CO2	Understand various phases of software development models
CO3	Design and develop correct SDLC model for software projects
CO4	Demonstrate knowledge and understanding to develop software for real life problems.
CO5	Develop various testing methodologies debugging tools and maintenance models to ensure the accountability of software.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2		3	2		1	2	2	3	1	2
CO2	1	2	2	2	2	1		1	2	2		2
CO3		2	2		2		1		2	2	2	3
CO4	2		2	2	2	2	1	2	2	2	1	2
CO5	1		2		3	1	1	2	3	3		2

B Tech 5th Semester (Information Technology)

IT-305 Microprocessors

L	T	P
3	1	

1. 8086 Architecture

CPU architecture, pin out & signal descriptions, internal operation, machine language instruction, instruction execution time, addressing modes, physical address computation, minimum & maximum mode configuration[1,4]

2. Assembly Language Programming

Assembler, instruction format, assembler directives, data transfer instruction, arithmetic instructions, branch instruction, NOP & HLT instructions, flag manipulation instruction, logical instruction, shift and rotate instruction, directions and operators. [1, 4]

3. I/O Interface

Serial communication, asynchronous, synchronous, physical, 8251A; Parallel communication: 8255 A, DMA controllers, 16-bit bus interface. [1, 4]

4. Pentium Architecture

Basic architecture of P II/ P III, Memory management models, registers and flags.

Basic data types in P II/ P III, addressing modes, instruction format and types, instruction set and prefixes. [2]

5. Memory Management & advanced Concepts

Modes of operation of P II/ P III – real, protected and virtual; superscalar architecture.

Branch prediction, MMX – register and instruction set, interrupt handling. [2]

BOOKS:

1. Liu and Gibson, Microcomputer Systems, 8086/8088 family: Architecture, Programming and Design, PHI.
2. Bray, Intel Microprocessors, The 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium & Pentium Processor - Architecture, Programming and Interfacing, PHI.
3. Intel, Pentium Processor Data Handbook, Intel, 1999.
4. A. K. Ray & K.M. Bhurchandi, Advanced Microprocessors and Peripherals: Architecture, Programming and interfacing, TMH
5. D.V. Hall, Microprocessors and Interfacing, TMH.

Course Outcomes (COs)	Description
CO1	Develop an understanding of basic concepts of microprocessors (4004 to Pentium-IV).
CO2	Understand the instruction set of 8086.
CO3	Able to apply the knowledge of assembly language to solve various problems.
CO4	Grasp an understanding of various peripheral device interfaces with 8086.
CO5	Able to design and implement various interfaces in real life different applications.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3			1	3	1		1	1		1
CO2	2	2	3	2	2		1		1	2		2
CO3	1	3		3	3	3	1	2	2	1	2	3
CO4	2	2	3	2	3		1	1	2	2	2	3
CO5	1	2	2	3	3		1	1	3	1	2	3

B Tech 5th Semester (Information Technology)

IT-307 Computer Networks

L	T	P
4	1	

1. **Introduction**
   Network Functions, Network Topology, Network Services, Switching Approaches, Transmission media and systems, multiplexing and signaling techniques, Error detection and correction, ISDN and BISDN.[1]

2. **Layered Architectures**
   Examples, OSI Reference Model, Overview of TCP/IP architecture, Socket system calls, SNMP, Electronic Mail. [1]

3. **Peer-to-Peer Protocols**
   Protocols, Service Models and End-to-End requirements, ARQ, Sliding Window, RTP, HDLC, PPP protocols, Statistical Multiplexing. [1]

4. **MAC and LAN Protocols**
   Multiple access communication, Random Access-ALOHA, Slotted-ALOHA, CSMA, CSMA-CD, Channelization – FDMA, TDMA, CDMA, Channelization in Cellular networks LAN Standards - 802.3, 802.4, 802.5, 802.6, FDDI, 802.11, LAN Bridges.[1]

5. **Packet Switching Networks**
   Packet network topology, Datagram's and Virtual Circuits – Structure of Switch / Router, Connectionless and Virtual Circuit packet Switching, X.25, Routing Algorithms, Traffic management and QoS – FIFO, Priority Queues, Fair Queuing, Congestion Control techniques.[1]

6. **TCP/IP**
   Architecture, Internet protocols – IP packet, Addressing, Subnet addressing, IP routing, CIDR, ARP, RARP, ICMP, Reassembly, UDP, Transmission Control Protocol – TCP, Reliable stream service, operation, protocol.[1]

BOOKS:

1. Leon Garcia and Indra Widjaja, Communication Networks – Fundamental Concepts and Key Architectures, TMH, 2000.
2. A.S. Tanenbaum, Computer Networks, 3/e, PHI, 1997.
3. Forouzan, Coombs and Fegan, Introduction to data Communications and Networks, TMH, 1999.
4. William Stallings, Data and Computer Communications ,5/e, PHI.

Course Outcomes (COs)	Description
CO1	Understand computer network basic, different models used for study of computer networks, ability to identify different designs, understanding of the issues surrounding wired and wireless Networks.
CO2	Design, calculate, and apply subnet masks to fulfil networking requirements and building the skills of routing mechanisms.
CO3	Analyse the features and operations of various application layer protocols such as Http, DNS, SMTP and FTP.
CO4	Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
CO5	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1			2	2	1				2
CO2	3	2	3	1	1	2	1		1	2	1	2
CO3	2	1	2	2	3	2		2			1	1
CO4	3	3	3	2	2	2	1	1		2		
CO5	2	2	1			2	2	1				2

B Tech 5th Semester (Information Technology)

IT-309 Communication System

L	T	P
4	1	

1. Spectral Analysis and Noise

Fourier series, Response of linear system Power spectral density, Fourier Transform, Convolution, Parseval's Theorem, correlation between waveforms, Impulse Function, Ideal low pass filter. Hilbert Transform. Random variables, Cumulative distribution function, Probability density function, Average value of random variables Central Limit Theorem Noise and its sources, Methods of noise calculation in network and interconnected networks, Mathematical representation of random noise. Narrow band noise and its representation, Transmission of noise through linear systems, Noise figure, Noise temperature, Computation of signals to noise ratio, and noise bandwidth.

2. Analog Modulation

Introduction, Amplitude Modulation, AM demodulators, Spectrum of AM signal, Double sideband suppressed carrier modulation, single side band modulation, Methods of generating SSB signals, vertical sideband modulation, frequency division multiplexing, angle modulation, Phase and frequency modulation, spectrum of FM signal, bandwidth of FM signal; NBFM & WBFM, FM generation and demodulation methods.

3. Pulse and Digital Modulation Techniques

Sampling theorem for low pass and band pass signals, time division multiplexing, concept of pulse amplitude modulation and pulse width modulation, demodulation of signals, pulse code modulation, delta modulation and adaptive delta modulation. Binary phase shift keying, differential phase shift keying, quadrature phase shift keying, M-ary PSK, QASK, Binary FSK, M-ary FSK, Minimum shift keying.

4. Code Division Multiple Access Systems

Spread spectrum model, direct sequence spread signals, CDMA system based on frequency hopped spread spectrum signal, Uncertainty, Information and Entropy, Source coding theorem, Data compaction, Discrete memory less channels, Mutual information, Channel capacity, channel coding theorem, information capacity theorem

BOOKS:

1. Simon Haykin, Digital Communication, John Wiley.
2. Taub and Schilling, Principles of Communication System, TMH.
3. G. Kennedy, Electronic Communication System, TMH.
4. J. G. Proakis, Digital Communications, MGH.

Course Outcomes (COs)	Description
CO 1	Acquire the knowledge of signal processing and presentation in communication systems
CO 2	Understand and analyze modulation and demodulation techniques.
CO 3	Ability to analyse and interpret various communication systems.
CO 4	Design and develop state-of-art of the communication systems

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	1	1					1		1
CO2	2	3	1	1	1					1		1
CO3	2	3	1	1	1			1	1		1	1
CO4	2	2	3	2	2	1		1	2	1	1	1

B Tech 5th Semester

(Information Technology) IT-311

Algorithms Pr.

L	T	P
		2

1. Implement the minimum cost spanning tree algorithm.
2. Implement the single source shortest path algorithm.
3. Implement the algorithm for optimal binary search tree.
4. Implement the algorithm for Job sequencing with deadlines.
5. Implement the algorithm for sum of subsets problem.
6. Implement the algorithm for travelling sales person problem.
7. Implement the algorithm for knapsack problem.
8. Implement the algorithm for n-queen problem.
9. Implement the algorithm for graph coloring.
10. Implement the algorithm for all pair shortest path

Course Outcomes (COs)	Description
CO1	Able to implement the minimum spanning tree and shortest part algorithms which are used in the designing of various types of networks.
CO2	Able to apply the concepts of backtracking and branch and bound programming to solve the various problem.
CO3	Apply the concepts of greedy algorithm and dynamic programming to solve the problems of job sequencing with deadline, travelling salesman etc.
CO4	Analyze the complexity of algorithms to solve various problems and understanding the nature of problems(like P, NP, NP Complete, NP Hard.)

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	3	2	1	2			1	1	1		2
CO2	3	2	3		2	1			1	2	1	1
CO3	3	2	3	1	2	1			1	1	1	2
CO4	2	3	2		3	1	1	1	1	2		2

B Tech 5th Semester (Information Technology)

IT-313 Software Engineering Pr.

L	T	P
-	-	3

Note: - Implement the following programs using C.

1. Implement Halstead's equation to compute various science metrics like volume etc., language level, estimated program length, effort and time in a program.
2. Compute average number of live variables per statement in a program.
3. Compute average life of variables in a program.
4. Compute psychological complexity of a program.
5. Compute McCabe's cyclomatic complexity of a program and generate its control graph.
6. Use some CASE tool for identifying various phases of software engineering, generate SRS document, design document like DFD and ER diagram, test cases generation for result automation, engineering admission automation (seat allocation during counseling).

Course Outcomes (COs)	Description
CO1	Understanding of software crises and real time problems
CO2	Analyze and apply appropriate SDLC models in real life problems and hypothetical scenario
CO3	Apply various software engineering tools to develop software
CO4	Analysis of requirement verification methods for real life scenario
CO5	Apply software metric for real life projects

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	2	1	1		1	1	1	1
CO2	2	3	2	2	2	1	1	1	1	1	1	1
CO3	2	2	2	2	3					1	1	1
CO4	2	3	2	2	2	1	1		1	1	1	1
CO5	2	2	2	2	3	1	1	1	1	1	1	1

B Tech 5th Semester (Information Technology)

IT-315 Microprocessors Pr.

L	T	P
-	-	2

1. Write a program to print the alphabets.

2. Write a program to read a integer number of max (16 bit), store that number in a register and display it digit by digit.

3. Repeat exercise 2 for 32 bit number.

4. Write a program to find factorial of a number, where result does not exceed 32 bit. Use procedure to calculate factorial and pass parameters

5. Write modular program to perform addition, subtraction, multiplication and division of two 16-bit numbers.

6. Repeat exercise 5 for two 32-bit numbers

7. Sort n numbers using modular program.

8. Check whether a given string is palindrome or not.

9. Reverse an input string.

10 Merge two sorted list of integers

11. Using int 10h, change the size of cursor, change the position of the cursor based on user's choice.

12. Write some programs, which use multiple data segments and multiple code segments. Do these programs by defining different segments in different files and link all of them to get the desired output.

Course Outcomes (COs)	Description
CO1	Develop a basic understanding of syntax of instruction set of 8086.
CO2	Able to apply the knowledge of assembly language to solve various problems.
CO3	Grasp an understanding of various peripheral device interfaces with 8086.
CO4	Develop the knowledge to implement various interfaces through assembly language programming.
CO5	Apply knowledge to implement different applications like stepper motor, traffic light, temperature monitoring etc.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	3	1	1	1		1		1			
CO2	2	3	3	2	3		2		1	1	2	1
CO3	1	3		3	1	2	3	1	2	1	2	1
CO4	2	2	3	2	3	3	2	1	3	1	3	2
CO5	1	2	2	3	3	3	3	1	3	1	3	2

B Tech 5th Semester (Information Technology)

IT-317 Advanced Java Pr.

L	T	P
		3

PROGRAMS IN JDBC

1. Write a JDBC Application which inserts data at run time
2. Write a JDBC Application to select values from table using prepared statement
3. Write a JDBC Application to design a form
4. Write a JDBC Application to find out all the tables in the database
5. Write a JDBC Application reading dates and null values from data base
6. Write a JDBC Application for SQL Procedure execution with both IN and OUT parameter using callable statement.
7. Write a JDBC Application for SQL function execution using callable statement

NETWORKING

1. Write a Client/Server Application using stream sockets
2. Write a Client /Server Application using datagram sockets
3. Write a Program for Simple file transfer
4. Write a Program for Multithreaded FTP server.

RMI

1. Write a Program for RMI Application
2. Write an RMI Application for invoking the data base to retrieve the results

JAVA BEANS

1. Write a Bean application for simple property
2. Write a Bean application for an Boolean property
3. Write a Bean application to retrieve the values from the table by invoking database.
4. Write a Bean Application for Indexed Property
5. Write a Bean Application for a Bound Property.
6. Write a Bean Application for a Constrained Property.
7. Write a Bean Application for Rotating a Molecular Bean

SERVLETS

1. Write a Servlet Program for Displaying a Message in a Browser Using Generic Servlet.
2. Write a Servlet Program to Communicate HTML Served.
3. Write a Servlet Program to Communicate the HTML-Servlet-Database.
4. Write a Servlet Program to Retrieve the Results from a Table in the format
5. Write a Servlet Program for Session Tracking using Hidden Form Fields
6. Write a Servlets Program for Session tracking using HTTP Session.
7. Program for session tracking using cookies

BOOKS

1. Deitel & Deitel, Java How to Programming, 3rd Edition ,Pearson Education.
2. Campione, Java Tutorial Continued, Addison Wesley
3. Patrick Naughton, The Complete Reference Java2, 4th Edition
4. Y.Daniel Liang, Introduction to Java Programming, PHI, 2002
5. Balaguruswamy, Introduction to Java.
6. Java Programming –Schaum Series.
7. Bruce Eckel,Thinking in Java, Pearson.
8. Cay Horstmann, Computing Concepts with Java 2 Essentials, John Wiley.

Course Outcomes (COs)	Description
CO1	Handling the data sources using a programming language i.e. how to interact with a database using java programming language
CO2	Design and architect a web application using various J2EE constructs such as servlets and JSPs. Usage and administration of a web-server such as Apache tomcat for web application deployment.
CO3	Enhancing/Redesigning the software development by specific design patterns based on the requirements such as Singleton, Factory etc. Usage of Client-Server technologies in java.
CO4	Usage of Client-Server technologies and java bean classes.
CO5	Able to design distributed java applications with RMI

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**
CO1		2	3			1						
CO2		3	3	1					2		1	
CO3		3	3		2			3				3
CO4										3		
CO5						2						2

B. Tech 6th Semester (Information Technology)
IT-302
Object Oriented Analysis and Design using UML

L	T	P
3	1	-

1. Review of Object Oriented Systems

Design Objects, Class hierarchy, inheritance, polymorphism, object relationships and associations, aggregations and object containment, object persistence, meta-classes, Object-oriented systems development life cycle, Software development process Object Oriented systems development: a use-case driven approach.[1,2]

2. Methodology for Object Oriented Design

Object modeling technique as software engineering methodology, Rumbaugh methodology, Jacobson Methodology, Booch Methodology, Patterns, Frameworks, the unified approach, unified modeling language (UML). [1]

3. Unified Modeling language

Introduction, UML diagrams, UML class diagrams, Use Case diagrams, UML dynamic modeling, Packages and model organization, UML extensibility, UML meta model. [1]

4. Object Oriented Analysis

Analysis Process, Use-Case Driven Object Oriented Analysis, Use-Case Model, Object Classification, Theory, Different Approaches for identifying classes, Classes, Responsibilities and Collaborators, Identifying Object Relationships, Attributes and Methods, Super-sub Class Relationships, A-Part of Relationships-Aggregation, Class Responsibilities, Object Responsibilities. [1,2]

5. Object Oriented Design

Object oriented design process, corollaries, design axioms, design patterns, object oriented design philosophy, UML Object Constraint Language, Designing Classes: The Process, Class Visibility, Refining Attributes, Designing Methods and Protocols, Packages and Managing classes, Designing Interface Objects, View layer interface design, Macro and Micro level interface design process. [1,2]

BOOKS:

1. Ali Bahrami, Object Oriented Systems Development, McGraw Hill, 1999.
2. Rumbaugh et. al, Object Oriented Modeling and Design, PHI, 1997.
3. Wendy Boggs, Michael Boggs, Mastering UML with Rational Rose, Sybex BPB Publications, 2007.
4. Alan Dennis, B H Wixom, D Tegarden, Systems Analysis & Design with UML version 2.0 An Object Oriented Approach, 2nd Edition, Wiley India, 2007.

Course Outcome (COs)	Description
CO1	An ability to perform analysis to understand the application domain and requirements of a proposed software system using requirements/feature lists, use cases, and simple static/dynamic UML models.
CO2	An ability to work in teams to perform the UML techniques as well as the ability to translate UML models into code using an Object oriented programming language.
CO3	An understanding of object oriented design patterns and how they can be used in object oriented analysis and design.
CO4	An understanding of related object oriented analysis and design techniques such as design by contract, refactoring, and test-driven design as well as an ability to understand new/existing OO frameworks.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		1	1	2	1						2	
CO2	1	1	2	3								
CO3		3	2	2	2				1		1	1
CO4	1	2	2	2	1				1		1	1

B. Tech 6th Semester (Information Technology)

IT-304 Software Quality Assurance

L	T	P
3	1	

1. **Product Quality & Process Quality:** Introduction, software system evolution, product quality, models for software product quality, process quality. [1]

2. **Functional Testing:** Boundary Value Testing: Analysis, robust testing, worst case testing, special & random testing, examples ; Equivalence Class Testing- equivalence classes, examples; Decision Table Based Testing: decision tables with examples. [2]

3. **Structural-Testing:** Path testing: DD-Paths, Metrics, basic path testing; Data Flow Testing, DU testing, slice based testing; Mutation testing. [2]

4. **Integration & System Testing:** levels of testing; integration testing: decomposition based, call graph based & path based integration; System testing: threads based structural & functional testing. [2]

5. **Object Oriented Testing:** Some issues in Object Oriented Testing, Units for object-oriented testing, implications of composition and encapsulation, implication of inheritance, implication of polymorphism, and levels of object-oriented testing [2]

BOOKS:

1. N.S. Godbole, Software Quality Assurance Principles & Practice, Narosa Publications, 2005
2. Paul C Jorgensen, Software Testing A Craftsman's Approach, 2nd Ed., CRC Press, 2002
3. Boris Beizer, Software Testing Techniques, Second Edition, Wiley India, 2005.
4. William Perry, Effective Methods for Software Testing, 3rd Edition, Wiley India, 2006.
5. Cern Kaner, Jack Falk, Nguyen Quoc, Testing Computer Software, Second Edition, Van Nostrand Reinhold, New York, 1993.
6. Louise Tamres, Software Testing, Pearson Education Asia, 2002

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Course Outcome (COs)	Description
CO1	Understand and apply tools for software quality assurance
CO2	Demonstrate various software testing techniques
CO3	Analyze information related to quality assurance techniques to recommend management strategies
CO4	Develop innovative solutions for various software development environments

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	1	3				1	1	1	1
CO2	2	2	2	2	2			1	1	1	1	1
CO3	2	3	2	1	2			1	1	1	1	1
CO4	2	2	3	2	2	1		1	1	1	1	1

B. Tech 6th Semester (Information Technology)

IT-306 Automata Theory

L	T	P
4	1	

1. Introduction

Introductionto Finite State Machine, Moore and Mealy FSMs, Equivalence, Regular Languages, Regular expressions, The memory required to recognize a language, Distinguishing one string from another, unions, Intersections and Complements, Finite automata, NFA, NFA with null transitions, Equivalence, Criterion for Regularity, Minimal Finite Automata, The pumping lemma, decision problems, Finite automata, Non-determinism and Kleen's Theorem, Regular and Non-regular languages. [1]

2. Context-Free Language

Context – Free Grammars, Definition of CFG, example of familiar languages, unions, concatenations and closures of CFLs, Derivation Tree, Ambiguity, unambiguous CFG for algebraic expressions, Simplified forms and normal forms, Push down automata, definition, deterministic PDA, PDA to CFG and Vice Versa, Parsing. Context Free and Non Context Free Languages, Pumping lemma for CFG, Intersection and complements of CFL. [1]

3. Turing Machines

Definition, Turing Machining as Language acceptors, combining TM, computing Partial Function with TM. Recursively Enumerable and Recursive Languages, Regular Grammars, context Sensitive grammars, Chomsky Hierarchy. Concept of unsolavability & reducibility, Halting Problem, Post correspondence Problem, Rice theorm[1]

4. Computability

Primitive Recursive Functions, Primitive Recursive Predicates and some bounded operations, unbounded minimalization and recursive functions, Godel Numbering, Non-numeric-functions.Growth rates of functions, Time and space complexity of TM, complexity Classes. P and NP. Polynomial-Time. Reductions and NP-Completeness, Cook's Theorem. [1]

BOOKS:

1. John C. Martin, Introduction to Languages and the Theory of Computation, MGH.
2. Lewis & Papadimitriou, Elements of the Theory of Computation, PHI.
3. Daniel I.A. Cohen, Introduction to Computer Theory: John Wiley.
4. J.E. Hopcroft and J.D. Ullman, Introduction to Automata Theory Languages and Computation, Narosa.

Course Outcome (COs)	Description
CO1	Learn theoretical foundations of computer science and familiarity with finite automata (deterministic or non-deterministic), FSM and master regular languages.
CO2	Classify types of languages and their acceptors.
CO3	Design of Turing machines and PDAs for various functions
CO4	Understand concept of decidability, unsolvability and recursive enumerability.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	3	3	2	1	1			1		2
CO2	2	3	3	3	2	2	2		1	1		2
CO3	2	2	3	3			2					2
CO4	1	1	3	3	1	1	1			1		1

B. Tech 6th Semester (Information Technology)

IT-322 Information Security

L	T	P
3	1	

1. **Introduction**
   Meaning of security, attacks, Computer Criminals, Methods of defense [1]

2. **Elementary Cryptography**
   Introduction, Substitution ciphers, Transpositions, Data encryption standard, AES Encryption Algorithm, Public key Encryption, Uses of Encryption. [1]

3. **Program Security**
   Secure Program, Non Malicious Program errors, Viruses and other malicious code, Targeted Malicious Code, Control against Program. [1]

4. **Protection in General Purpose Operating System**
   Overview, File Protection Mechanisms, User Authentication, Designing Trusted Operating System, Security Policy, Models of Security, Trusted Operating System Design [1]

5. **Database Security & Security in Networks**
   Introduction to Database, Security Requirements, Reliability and Integrity, Sensitive Data,Inference,Multileveldatabase.Networksecurity:NetworkConcepts,ThreatsinNetworks Networks ,Security controls, Firewalls ,Intrusion Detection System, Secure Email[1]

6. **Administering Security**
   Risk analysis, legal, Privacy & Ethical issues, Computer Security: Protecting Programs and Data [1]

BOOKS:

1. Charles P.Pfleeger ,Share Lawrence Pfleeger, Security in Computing, Pearson Education, 2/e.
2. Charlie Kaufman, Perlman & S Peeciner, Network Security, Pearson Education, 2/e.

Course Outcomes (COs)	Description
CO1	To understand basic terminology and concepts related to network and system level security.
CO2	To understand basics of computers and networking including Internet Protocol, routing, Domain Name Service, and network devices.
CO3	To learn basic cryptography, security management, and network security techniques
CO4	To understand policies as a tool to effectively change an organization's culture towards a better secure environment.
CO5	To form of a case study for designing and auditing a security system at conceptual level.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		1		1	2	2	3	1		2		
CO2	2		1	1	1		3		1	2		2
CO3	2	1	1	2	2	1	3		1	3		2
CO4	1	2		1	1	2	2	2	1	2	1	1
CO5	1	1	1	1	1	2	2	1	1	2	2	1

B. Tech 6th Semester (Information Technology)

IT-324 Advanced Database System

L	T	P
3	1	

1. Parallel & Distributed Databases

Architecture for parallel databases, Parallel query evaluation, parallel zing individual operations, parallel query optimization; Introduction to distributed databases, distributed DBMS architectures, storing data in a distributed DBMS, distributed catalog management, distributed query processing, updating distributed data, introduction to distributed transactions, distributed concurrency control, recovery.

2. Data Mining

Introduction, counting co-occurrences, mining for rules, tree structured rules, clustering, similarity search over sequences.

3. Object Database Systems

User defined ADT, structured types, objects & reference types, inheritance, design for an ORDBMS, challenges in implementing an ORDBMS, OODBMS, and comparison of RDBMS with OODBMS & ORDBMS.

4. Advanced Topics

Advanced transaction processing, integrated access to multiple data source, mobile databases main memory databases, multimedia databases, GIS, temporal & sequence databases.

BOOKS:

1. R. Ramakrishna & J. Gehrks Database Management Systems MGH, International Ed., 2000.
2. Korth, Silberschatz, Sudershan: Data Base concepts, MGH, 2001.
3. C. J. Date, Database Systems, 7th Ed., Addison Wesley, Pearson Education, 2000.

Course Outcome (COs)	Description
CO1	To familiarize students with parallel and distributed databases: need and related issues for the design and development.
CO2	To familiarize students with data mining system and process.
CO3	To familiarize students with object oriented concepts and OODBSs.
CO4	To familiarize students with advanced topics in the area of database technology.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	1		1						
CO2	3	3		3	2							
CO3	3	3	3	2	2							
CO4	3	3	3	2								

B. Tech 6th Semester (Information Technology)

IT-326 VHDL

L	T	P
3	1	-

1. **Introduction to HDL:** Design Flow, Design Methodologies, HDL History, Capabilities, Hardware Abstraction, Basic Terminology, Model Analysis, Comparison between VHDL and Verilog.[1]
2. **Basic VHDL Elements**: Identifiers, Data objects,Data Types, Operators. [1,2]
3. **Behavioral Modeling:** Entity declaration, architecture body, Various Sequential Statements and Constructs, multiple processes, postponed processes. [1]
4. **Dataflow modeling**: Concurrent Signal Assignment Statements, delta delay model, multiple drivers, block statement, concurrent assertion statement. [1]
5. **Structural modeling**: Component Declaration, component Instantiation, resolving signal values. [1]
6. **Supporting Constructs**: Generics and Configuration, Subprograms and Overloading, Operator overloading, Package declaration, package body, design Libraries, visibility. [1, 2]
7. **Advanced Features**: Generate statements, qualified expressions, type conversions, guarded signals, attributes, aggregate targets. [1]
8. **Programmable Logic Devices (PLD) and Field Programmable Gate Arrays (FPGA):** Basic Concepts, Architecture and Usage. [1,2]
9. **Combinational Logic Design:** Adders/Subtractors, ALU, Multipliers, Shifters. [1,2]
10. **Sequential Logic Design:** Synchronous Sequential Circuits, Asynchronous Sequential Circuits. [1,2]

BOOKS:

1. J.Bhasker, A.VHDL, Primer, 2/e,,PHI.
2. Fundamentals of Digital logic Design with VHDL, 2/e, TMH.
3. D. Perry, VHDL, 3rd Ed,TMH.
4. Skahil, VHDL for Programmable logic,2nd Ed , Wiley.

Course Outcome (COs)	Description
CO1	Able to understand the concept of HDL and VHDL and its identifiers, data type, data objects and the operators.
CO2	To understand the modeling structure like dataflow, behavior and structure modeling.
CO3	Implement subprograms, overloading, description about packages and advance features like type conversions, qualified expressions, guarded signals and aggregate targets
CO4	To implement combinational and sequential logic circuits and the basic architecture of FPGA.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2			2					1	2	2
CO2	2	1	3	3	2		2	1	2	3	2	2
CO3	1	2	2	3	1		1		2	2	1	3
CO4				2	3		2		2	3	3	2

B Tech 6th Sem (Information Technology)

HUT-322 Soft Skills Workshop

L	T	P
-	2	-

The course is framed to develop soft skills of students to a level when they can communicate effectively in professional and social situations orally as well as in writing. Keeping in mind the wide variation in the backgrounds of participating students, the contents and the approach have been kept flexible and may be modified by the teachers to suit individual needs.

Introduction to the process of communication; types of communication; common barriers and their remedies. Verbal and non-verbal communication; common errors in usages and syntax; figurative use of language. Learning pronunciation, stress and intonation through language lab. Body language – its importance and effective use in verbal communication.

Writing technical papers and reports for publication. Preparation of reports/papers for oral presentation – common errors and misconceptions, especially in power point presentation. Handling questions.

Group discussion; dos and don'ts for participation in a GD. Preparing a CV/Resume and writing a job application. The art of interview performance.

B. Tech 6th Semester (Information Technology)

IT-312 Computer Networks (Pr.)

L	T	P
		3

1. Study of various topologies of Network

2 RJ-45 connector and its circuit diagram

3. BNC connector and its circuit diagram

4. Thick & Thin coaxial cable

5. CKT diagram of terminator

6. CKT diagram of T-connector

7. Study pf different type of cable in designing (10 base 7, 10 base 2, 10 base 5, UTP OFC)

8. CKT diagram of network interface card.

9. Study of bridge, router, hub, gateways.

10. Layout of Installation of LAN with S/W & H/W requirement.

Course Outcomes (COs)	Description
CO1	To make students aware about various types of cables used in guided media like coaxial cable, optical fiber cable, twisted pair cables and its categories.
CO2	To be able to understand various components and protocols of Computer Networks.
CO3	Ability to analyze and simulate different protocols.
CO4	To be able to simulate, analyze, and evaluate performance of Ethernet LAN, Wireless LAN, and WAN under different implementation conditions.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12
CO1	2			2			1			2		
CO2		2		1								2
CO3	2	2	1	2	3				2			1
CO4	3	2	3	3	3		1		2	1		

B. Tech 6th Semester (Information Technology)

IT-314 Advanced Pr. I

L	T	P
-	-	3

NOTE: In Advanced Pr 1 some Practicals based on other papers offered in this semester and/or following UML based practicals will be performed using Case tool.

Implement the following programs using UML Notations

1. Create an ATM system model including all object diagrams.
2. Create a use case diagram for order processing system.
3. Create a model to study message transfer between objects.
4. Create sequence & collaboration diagram to add a new order in order processing system.
5. Take the classes created in above programs and group them into packages.
6. Study the concept of addition of attributes to the classes designed above.
7. Study the concept of relationship between classes that participate in the Enter New Order use case.

Course Outcomes (COs)	Description
CO1	Understand the concepts of object-oriented development and its applications architecture.
CO2	Demonstrate various approaches of system and object design.
CO3	Implement object-oriented modelling for real world problems using static diagrams.
CO4	Implement object-oriented modelling for real world problems using dynamic diagrams.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**
CO1	2	2	2		1			1	1		1	2
CO2	2	2	2		1			1	1		1	2
CO3	2	2	2		1	2			1			2
CO4	2	2	2		1	2			1			2

B. Tech 6th Semester (Information Technology)

IT-316 Visual Programming & Server Side Programming Pr

L T P

3

1 Write a Program using ASP to check whether a folder exists on a server or not

2 Write a Program using ASP Get File method is used to find out information about a given file.

3 Write a Program using ASP for HTTP screen-scraping and caching.

4 Write a Program using ASP to display the information after submission from user.

5. Write a Program in ASP to display present day, month & date. Also display digital clock.

6 Send information to the user after he submit the form using GET & POST method & Implement from validation.

7 Write a Program in ASP that has a form taking the user's name as input. Store this name in a permanent cookie & whenever the page is opened again, then value of the name field should be attached with the cookie's content.

8 Use ad-rotator to change advertisements on client side request.

9. Create a Session dictionary using object tag. In session-on start add keys for time, user agent, remote I.P. & add appropriate values. Create a simple page to display the values.

10 .Implement Session tracking using user authentication.

11 Write a Program to delete all cookies of your web site that has created on the client's computer.

12 Write a Program is ASP to check the capabilities of the browser using browser capability component.

BOOKS:

1. Jason Hunter & William Crawford, Java Servlets Programming, O Reilly,2nd Edition, 2001.
2. Marty Hall, Larry Brown and Yaakov Caikin ,Core Servlets and JSP, 2nd Edition.
3. Marty Hall, More Servlets and JSP
4. Keith Morneau & Jill Batistick, ASP Web Warrior Series, 1st Edition.
5. Manuel Alberta Ricart & Stephen Asbury ,ASP 3 Developer's Guide,Hungry Minds Pap/cdr Edition.

Course Outcome (COs)	Description
CO1	Ability to understand and develop web applications using current server side technologies.
CO2	Learn to develop web applications containing web forms, validators, database programming, session tracking using ASP.NET.
CO3	Ability to develop web applications having file handling, form validation, database, session tracking using PHP.
CO4	Ability to code and develop graphics using Python.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	3	1	3	1				1	3	1
CO2	3	2	3		3	1			1	1	2	
CO3	3	2	3		2	1			2	1	2	
CO4	2	2	2	2	2		1		1	1	1	

B Tech 6th Semester (Information Technology)

IT-318 Software testing Pr

L	T	P
-	-	3

(A) Implement the following in C/C++

1. Develop a formula for the number of robustness test cases for a function of n variables.
2. Develop a formula for the number of robust worst test cases for a function of n variables.
3. Find a Cyclomatic complexity of the graph.
4. Study the development of decision table for the triangle problem.
5. Study the development of decision table for the next date function.
6. Develop a program for the data flow testing.
7. Develop the program for the white box testing.
8. Develop the boundary value analysis (test case) on triangle problem.
9. Develop the boundary value analysis (test case) on next date function.

(B) Developing a Small Project /Tool to Generate Test data, to Execute test data etc.

(D) Exposure to Automated Case tool

BOOKS:

1. Paul C. Jorgensen, Software testing--A Craftsman's Approach, 2nd Edition, CROC Press
2. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edtion Narosa Publications
3. Meyers, Art of Software Testing, 2nd Edition , John Wiley Publication,2004.

Course Outcome (COs)	Description
CO1	Analyse different approaches to software testing, and select optimal solutions for different situations and projects with the help of decision tables.
CO2	Able to define, formulate and analyze a problem using various aspects of Structural, Integration and Object Oriented Testing.
CO3	Understand the process to be followed in software development life cycle and the role played by software testing in the SLC.
CO4	Able to Design and Implement a Micro Software Testing project and understand the role of various testing techniques in improving the efficiency and robustness of software.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	2	3	1		1				
CO2	3	3		2	2						1	1
CO3	1					2	2					
CO4	3	2	2	3	3	1		2	3	2	3	2

B Tech 6th Semester (Information Technology)

HUT - 311 Business Management

L	T	P
3	1	-

Note to the paper setter: The number of questions to be set will be seven, one from each unit. Out of these one question will be compulsory. The examinees will be required to attempt the compulsory one and any other four questions. All questions shall carry equal marks.

UNIT – I Business Environment:

Business : Concept, nature and objectives. Social Responsibility of Business **Environment:** Meaning of environment, Constituents of business environment; Economics, Social, political, legal and technological environment.

UNIT – II General Management

Management: Definition, nature and significance, Henry Fayol's Principal of Management; Human Relations Approach Functions of Management (i) Planning (ii) Organising (iii) Directing and (iv) Controlling.

UNIT – III Financial Management

Introduction of Financial Management, Objectives of Financial Decisions, Status and duties of Financial Executives. Financial Planning – Tools of financial planning. Management of working capital, Factors affecting requirements of working capital. Capital structure decision. Features of appropriate capital structure. Sources of finance.

UNIT – IV Personnel Management

Personnel Management – Meaning, Nature and importance; Functions of Personnel Management – (a) Managerial Functions and (b) Operative functions. Job Analysis: Meaning and importance; Process of Job Analysis; Job Description and job specification. Human Resource Development-Meaning and concept.

UNIT – V Production management

Production management: Definition and Objectives

Plain location: Ideal plant location. Factors affecting plant location.

Plant Layout : Ideal Plant layout, factors affecting Plant layout.

Work Measurement: Meaning, Objectives and Essentials of work Measurement.

Production Control: Meaning and importance of production control and steps

Involved in production control.

UNIT – VI Marketing Management

Nature scope and importance of marketing management. Modern Marketing

concepts. Role of marketing in economic development. Marketing Mix.

Marketing information System. Meaning, nature and scope of International

Marketing.

BOOKS :

1. Business Environment- Francis Charurilam (Himalaya Publishing House)
2. Management- Harold, Koontz and Cyrilo' Donell (Mc Graw Hill)
3. Principles of Personnel Management – Edwin B. Flippo (Mc Graw Hill)
4. Personnel Management and Industrial relations – D.C.Sharma and R.C.Sharma (SJ Publications, Meerut)
5. Basic Marketing – Cundiff and Still (PHI, India)
6. Marketing Management – S.A. Sherlekar (Himalaya Publishing House, Bombay)
7. Principles of Practice of Management – L.M.Prasad
8. Financial Management – I.M.Pandey (Vikas Publication House, New Delhi)
9. International Marketing – Vorn terpestre and Ravi Sasathy
10. Production Management – E.S.Buffa and W.H.Tausart, Richand D.Irwin, Homewood, Illionis.
11. Personnel Management – C.B.Mamoria (Himalaya Publishing House)

B. Tech 7th Semester (Information Technology)

IT-401 Advanced Data Structures

L T P

3 1

Unit-1: Review of Elementary Data Structures: Arrays, linked lists, stacks, queues, binary trees, hashing, graphs, sorting & searching techniques, Sparse Matrices: Properties of sparse matrices, Linked list representation of sparse matrices

Unit-2: Threaded Trees: Properties of threaded trees, insertion, deletion and traversal AVL Trees: Properties of AVL trees, rotations, insertion and deletion. Red-Black Trees: Properties of red-black trees, rotations, insertion and deletion.B-Trees: Definition of B-trees, basic operations on B-trees, deleting a key from a B-tree.

Unit-3: Heaps: Properties of Min-max heaps, building a heap, basic operations on heaps, application of min-max heaps. Binomial heaps: Binomial tress and binomial heaps, operations on binomial heaps. Fibonacci heaps: Structure of Fibonacci heaps, mergeable heap operations, decreasing a key and deleting a node, bounding a maximum degree

Unit-4: Data Structures for Disjoint Sets: Disjoint set operations, linked list representation of disjoint sets, disjoint set forests.

Unit-5: Graph Algorithms: Topological sort, minimum Spanning tree, single-source shortest paths, all-pairs shortest paths, bi-connected components, strongly connected components, cycles, articulation points, bridges.

Unit-6: String Matching: string-matching algorithm, Rabin-Karp algorithm, String matching with automata, Knuth-Morris-Pratt algorithm, Boyer-Moore algorithm.

BOOKS:

1. E Horowitz and S. Sahni, Fundamentals of Data Structures, Galgotia, 1999
2. R.B. Patel, Expert Data Structures in C, Khanna Publishers, 2001.
3. R.L. Kruse, Data Structures & Program Design in C, PHI.
4. D.F. Knuth, The art of Computer Programming Vol 1, Narosa Publications, 1985.
5. Byron S. Gottfried, Theory and Problems of Programming with C Language, Schaum Series, TMH, 1998.
6. Cormen, Leiserson and Rivest, Introduction to Algorithms, 2/e, PHI.
7. Horowitz, Ellis and Sahni, Sartaj, Fundamentals of Computer Algorithms, Galgotia Publications.
8. Aho, Hopcroft, and Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley.

Course Outcome (COs)	Description
CO1	Ability to develop applications, which uses complex data structures such as trees and graph.
CO2	Technically know how to design suitable data structure with appropriate operations for specific application, by considering the parameters such as time complexity, space complexity, design complexity.
CO3	Ability to choose best data structure for a real time problem, to solve it effectively.
CO4	Skill to analyse the complexity of operations of complex data structure.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	2	3	1	1	3	2	3	3	2
CO2	3	3	3	2	3	2	3	2	2	2	2	3
CO3	2	1	2	1	3	2	3	2		2	2	2
CO4	2	2	1	1	1	1	2		1			2

B Tech 7th Semester (Information Technology)

IT-403 Compiler Design

L	T	P
3	1	

1. **Introduction & Lexical Analysis**
   Introduction and types of translators, the structure of a compiler, design of lexical analyzer, specification & implementation of lexical analyzer. Parsers shift-reduce parsing, operator- precedence parsing, top-down parsing, recursive descent parsing, predictive parsers. [1]

2. **Parsing Techniques & Syntax Directed Translation**
   LR Parsers, the canonical collection of L R (O) items, construction of SLR parsing tables, constructing canonical L.R. Parsing tables, Constructing LALR parsing tables, implementation of LR Parsing tables Syntax-directed translation schemes, implementation of syntax directed translators, intermediate code, postfix notation, parse trees and syntax trees, three address code, quadruples, and triples, translation of assignment statements, Boolean expressions, control statements. [1]

3. **Symbol Table & Run Time Storage Administration**
   The contents of a symbol table, data structures for symbol tables, representing scope information. Implementation of a simple stack allocation scheme, implementation of block structured languages, storage allocation in block structured language. Error-lexical phase errors, syntactic phase errors, semantic errors. [1]

4. **Code Optimization & Code generation**
   The principle sources of optimization, loop optimization, the DAG representation of basic blocks, value number and algebraic laws, global data-flow analysis, Object programs, problems in code generation, a machine model, a simple code generator, register allocation and assignment, code generation from DAGs, peephole optimization. [1]

BOOKS

1 Aho A.V. and Ullman J.D, Principles of Compiler Design, Addison Wesley.
2. Donovan, J, System Programming, TMH.
3. D.M. Dhamdhere, Compiler Construction-Principles and Practice,McMillan India.
4. David Gries, Compiler Construction for Digital Computer.

Course Outcome (COs)	Description
CO1	Learn the fundamentals of language translator and compiler design
CO2	Analyse various parsing algorithms and grammar transformation techniques
CO3	Demonstrate various techniques for code optimization, symbol table organization, code generation to improve the performance of a program
CO4	To understand the contemporary issues in compiler design for solving a real world problem.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1			2		1	1		1		2
CO2	3	2	2	1	1			1				1
CO3	2	3	1		1	1	2	1	2	3	1	2
CO4	3	3	2	1	2	1		1	1	2		2

B. Tech 7th Semester (Information Technology)

IT-405 Software Project Management

L T P

3 1

1. **Conventional Software Management**.
   Evolution of software economics. Improving software economics: reducing product size, software processes, team effectiveness, automation through software environments. Principles of modern software management.

2. **Software Management Process**
   Framework: Life cycle phases- inception, elaboration, construction and training phase. Artifacts of the process- the artifact sets management artifacts, engineering artifacts, and pragmatics artifacts. Model based software architectures. Workflows of the process. Checkpoints of the process.

3. **Software Management Disciplines**
   Iterative process planning. Project organizations and responsibilities. Process automation. Project control and process instrumentation- core metrics, management indicators, life cycle expectations. Process discriminants.

BOOKS:

1. Walker Royce, Software Project management, Addison Wesley, 1998.
2. Harvey Maylor, Project management, Pearson edition, 3rd Ed,2006
3. W.S. Humphrey, Managing the Software Process, Addison Wesley,2005
4. Ramesh, Managing global software Projects, TMH, 2001.

Course Outcome (COs)	Description
CO1	Apply models based empirically derived formulas to find scope of project and to estimate the project cost based on LOC or FPs by using.
CO2	Identify internal attributes (Maintainability, Flexibility, Portability, Re-usability, Readability, Testability, and Understandability). Apply internal attributes to evaluate External Quality Characteristics: Correctness, Usability, Efficiency, Reliability, Integrity, Adaptability, Accuracy, and Robustness.
CO3	Understand different types of relationship exist among data and control structures of different modules of a project or within same module of a project.
CO4	Select McCabe's Cyclomatic Complexity, Cohesion, Coupling and Function Points for analyzing internal quality.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	2	1		1	3	1	2	3	1
CO2	3	3	3	2	3	3	2	2	3	3	3	1
CO3	2	3	3	3	3	1	2	1	2	3	3	2
CO4	3	3	3	2	3		2	1	1	3	3	2

B. Tech 7th Semester (Information Technology)

IT-421 Data Warehousing and Data Mining

L	T	P
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Unit-1: Data warehousing Definition, usage and trends. DBMS vs. data warehouse, Data marts, Metadata, Multidimensional data mode, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.

Unit-2: Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager.

Unit-3: Data warehouse implementation, computation of data cubes, modelling OLAP data, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse.

Unit-4: Data mining definition & task, KDD versus data mining, data mining techniques, tools and applications.

Unit-5: Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification, data mining languages and standardization of data mining.

Unit-6: Data mining techniques: Association rules, Clustering techniques, Decision tree knowledge discovery through Neural Networks & Genetic Algorithm, Rough Sets, and Support Victor Machines and Fuzzy techniques.

Unit-7: Mining complex data objects, Spatial databases, Multimedia databases, Time series and Sequence data; mining Text Databases and mining Word Wide Web.

BOOKS:

1. Sam Anahory & Dennis Murray, Data Warehousing In the Real World, Pearson, 1997
2. Jiawei Han & Micheline Kamber, Data Mining- Concepts & Techniques, Morgan Kaufmann, 2001,.
3. Arun Pujar, Data Mining Techniques, University Press; Hyderbad, 2001,.

REFERENCE BOOKS:

1. Pieter Adriaans & Dolf Zantinge, Data Mining, Pearson, 1997.
2. Alex Berson, Data Warehousing, Data Miniing and OLTP, Mc Graw Hill, 1997.
3. Mallach, Data warehousing System, Mc Graw Hill, 2000.
4. W.H. Inman, Building the Data Warehouse, John Wiley & Sons,1996.
5. W.H Ionhman, C.Klelly, Developing the Data Warehouses, John Wiley & Sons.
6. W.H.Inman, C.L.Gassey, Managing the Data Warehouses, John Wiley & Sons.

Course Outcome (COs)	Description
CO1	Understand the principles and applications of data mining and warehousing, also able to identify the scope and necessity of system.
CO2	Describe the theoretical constructs and processes of data mining and warehousing
CO3	Investigate the various data mining and warehousing models and techniques, in solving the real world problems.
CO4	Design and analyse, a lightweight prototype or simulation that supports the concept of data mining and warehousing.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2		2	1	1	1	1			2	2
CO2	2	1		2	2			2		1	2	1
CO3	2	2	2	2	1	1	1				2	
CO4	2	3	3	3	1					1		2

B Tech 7th Semester (Information Technology)

IT-423 Advanced Communications

L	T	P
3	1	

1. **Physical Layer**
   Theoretical basis for Data Communication, Guided Transmission Media, Wireless Transmission Media, Wireless Transmission, Communications Satellites,PSTN,Mobile Telephone System, Cable television.[2]

2. **Wireless Networks**
   Introduction to 1G Cellular Networks, 2G Cellular Networks, 3G Cellular Networks & 4G Cellular Networks, IEEE 802.11 Standard, IEEE 802.11 a/b/c Standards, IEEE 802.15 Standard ,IEEE 802.16 Standard, IEEE 802.20 Standard, IEEE 802.21 Standard.[1]

3. **Cellular Standards**
   AMPS & CTACS,IS-54 &IS-36, GSM, CDMA Digital Cellular Standard,CT2 Standard for Cordless Telephone, Digital European Cordless Telephone (DECT), PACS,PDC,PHS, US PCS, UMTS, IMT-2000,LTE.[1]

4. **Mobile Radio & Security issues in Mobile and Wireless Networks**
   Mobile radio, Cellular Telephony, Mobile, Radio propagation, Small Scale & Multipath fading , Security issues in Mobile and wireless networks, Need for security, Attacks on Wireless Networks, Security Aspects in Cellular Standard (eg.GSM-Pin code protection, Mobile Cloning, Authentication, Encryption, TMSI), Security Services, WEP, WPA. [1,3]

BOOKS

1. Theodore S. Rappaport, Wireless Communications-Principles & Practices, 2nd Edition, PHI.
2. Andrew S. Tanenbaum, Computer Networks, 4th Edition, PHI.
3. P.Nocopolitidis, Wireless Networks, John Wiley & Sons.

Course Outcome (COs)	Description
CO1	Understand the fundamentals of various transmission medium and communication systems.
CO2	Able to understand cellular networks and different IEEE specifications for wireless networks.
CO3	Assess, formulate and evaluate different cellular network standards for various modern communication systems
CO4	Understand the need of security and analyse various security services used in cellular networks.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1	2	2	1	1	1		1		2
CO2	2	3	1	2	1	1		1	1	2		2
CO3	3	3	2		2	1	1	1	1	1	1	2
CO4	3	2	2	1	2	1		1	1	2	1	2

B Tech 7th Semester (Information Technology)

IT-425 Computer Graphics

L	T	P
3	1	

1. **Basic Concept**
   Introduction, Point Plotting technique, Coordinate System, Line drawing algorithm, Circle generators, Line drawing display, storage tube display, refresh line drawing display.

2. **Computer Graphics Devices**
   Point and positioning drive, light pen, mouse, tablet, Input technique, Positioning technique, and character recognition.

3. **2-D and 3-D transformation**
   Basic transformation, homogenous coordinate system, composite and other transformation, Point and line clipping, polygon clipping, text clipping, view planes.

4. **Interactive Raster Graphics**
   Raster graphics fundamental, solid area Scan Conversion, Interactive raster graphics, Raster graphics systems.

5. **3-D Graphics**
   Curve and Surfaces, Bezier and B -spline method, perspective depth, Hidden Surface elimination, depth buffer algorithm, scan line coherence and area coherence algorithm, priority algorithm.

6. **Graphics Systems**
   Device Independent graphs system, Graphics System design, Case Study of Graphics, Kernel System.

BOOKS

1. Hearn and Baker, Computer Graphics, 2nd Ed., PHI.
2. Rogers, Principles of Computer Graphics, MGH.
3. Folay, Fundamentals of Interactive Computer Graphics, Addison Wesley.
4. Harrington, Computer Graphics – A Programming approach.
5. Newmann and Sproull, Introduction to Interactive Computer Graphics.

Course Outcome (COs)	Description
CO1	To learn algorithms to build the basic blocks of graphic systems.
CO2	To learn functionalities of input and output devices for graphic systems
CO3	To learn modelling, manipulation, clipping and rendering operations for graphic systems.
CO4	To learn shapes of objects in various curves and splines methods.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	2		1	1			1			1
CO2	1											1
CO3	2	1	2	1	2			1	1			1
CO4	2	1		2					1			1

B.Tech 7th Semester (Information Technology)
IT-427 Security and Cryptography

L	T	P
3	1	

1. **Traditional Cryptography**
   Cryptanalysis, substitution and transposition ciphers, Cryptographic principles, secret-key algorithms: DES, DES chaining, Breaking DES, IDEA, Differential and Linear cryptoanalysis Public-key algorithms: RSA, Knapsack
2. **Authentication protocols**
   KDC protocol, shared secret key, Diffle-Hellman key exchange, Needham-Schroeder protocol, using Kerberos, interlock protocol, digital signatures secret key and public key signatures, DSS, message digest, MD5 and secure hash algorithms
3. **Computer Security Mechanisms**
   Role of different security mechanisms, passwords technology and administration, principles of database system security, epidemic of viruses: types of viruses, study of different virus codes, means of spread, prevention from virus, life cycle of a virus, immunization, Trojan horse and bombs with examples, writing antivirus/Trojan codes.
4. **Network Security**
   Basics, security functions, preventing loss and damage, securing local area network – authorization, security plan and policy, securing enterprise network – setting priorities, security plans, securing network components, hardware security, levels of access control and authorization.

BOOKS

1. Richard H. Baker, Network Security, McGraw Hill International Ed.,1996.
2. B. Schneier, Applied Cryptography, John Wiley New York, 1996.
3. C. Kaufman ET. al, Network Security, Prentice Hall International, 1998.

Course Outcome (COs)	Description
CO1	To be able to understand and analyze traditional cryptographic mechanisms and authentication protocols.
CO2	To be able to solve problems (numerical and logical) related to traditional cryptographic mechanisms and authentication protocols.
CO3	Ability to understand and analyze various threats and security mechanisms related to computer security.
CO4	Ability to understand and analyze various threats and security mechanisms related to network security.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2							1				
CO2	3	2	1	2								
CO3	2	1		1		2		2			2	1
CO4	2	1		1	2	1		2			2	1

B Tech 7th Semester (Information Technology)

IT-429 Mobile Computing

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1. Introduction

Introduction, Challenges in mobile computing, coping with uncertainties, resources poorness, bandwidth etc.Cellular architecture, co-channel interference, frequency reuse, capacity increase by cell splitting. Evolution of mobile system: CDMA, TDMA, FDMA, GSM.Mobility management, Mobility handoff, types of handoffs, location management, HLR-VLR scheme, hierarchical scheme, predictive location management schemes, mobile IP, cellular IP.

2. Date models & File system

Publishing & Accessing data in Air: Pull & push based data delivery models, data dissemination by broadcast, broadcast disks, directory service in air energy efficient indexing scheme for push based data delivery.

File system support for mobility: Distributed file sharing for mobility support, Coda and other storage manager for mobility support.

3. Ad-Hoc Networks

Ad-hoc network routing protocols: Destination sequenced distance vector algorithm, cluster based gateway switch routing, global state routing, fish eye state routing, dynamic source routing, and ad-hoc on demand routing, zonal routing algorithm.

4. Transaction models & commerce

Mobile transaction and commerce: Model for mobile transaction, Kangaroo and Joye Transaction model, payment model for mobile transaction, electronic payment, team transaction protocols for mobile commerce.

BOOKS

1. Dejan Milojicic, Fedrick Douglis, Richard Wheeler, Mobility: processes, Computers & Agents, Addison-Wesley Professional, 1999.
2. Yi-Bing Lin & Imrich Chlamtac, Wireless and Mobile Networks Architectures, John Wiley & Sons, 2001.
3. Raj Pandya ,Mobile & Personal Communication systems & services, PHI, 2001.

Course Outcome (COs)	Description
CO1	Understanding of wireless media and evolution modern cellular networks.
CO2	Knowledge of components involved and it's working of cellular networks.
CO3	Ability to understand data dissemination and its various models in client server principle.
CO4	Understanding of mobile ad hoc network (MANET) and learn various routing protocols of it.
CO5	Study of application requirements of mobile computing system.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2		1								1
CO2	2	3	2	1					1	1		1
CO3	2	2	3	1	2			2				1
CO4	2	2	3	1	2	2	1	2	2	1	1	1

B. Tech 7th Semester (Information Technology)

IT-411 Advanced Data Structures Pr

L T P

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1. Write a program to insert and delete the nodes in link list at different locations.
2. Write a program to implement the concept of binary search tree.
3. Write a program to implement the concept of AVL tree.
4. Write a program to implement the concept of Red Black tree.
5. Write a program to implement the concept of B trees.
6. Write a program to implement the heap sort.
7. Write a program to implement the concept of Fibonacci heaps.
8. Write a program to implement the concept of binary search tree.
9. Write a program to implement the all pair shortest path problem.
10. Write a program to implement the Rabin- Karp algorithm.
11. Write a program to implement the Boyer Moore algorithm.

Course Outcome (COs)	Description
CO1	Able to implement the various operations on linked list and Binary search tree which can be used to implement the dynamic sets of item.
CO2	Perform the various concepts of balancing trees such as red black tree, AVL tree and B-tree used for designing the real time application.
CO3	Implement the basic concepts of the various types of heaps which helps in the designing of the various types of priority queues.
CO4	Implement the basic string searching algorithms which are highly used in Intrusion detection, bioinformatics etc.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	1	2	1	2		1	1	3	2
CO2	3	2	3	2	2	2	2	1	2	2	3	3
CO3	2	2	3	2	2	2	2	1	1	2	2	3
CO4	2	3	3	2	2	1	2	1	2	2	2	3

Minor Project
IT– 413

Course Outcomes (COs)	Description
CO1	Ability to apply knowledge of mathematics, science & engineering in practice and identify, critically analyze, formulate & solve engineering problems with select appropriate engineering tools and techniques and use them with dexterity.
CO2	Demonstrate and able to communicate effectively, appreciate the importance of goal setting and to recognize the need for life-long learning.
CO3	Design a system & process to meet desired needs within realistic constraints such as health, safety, security and manufacturability with devise & conduct experiments, interpret data & provide well informed conclusions.
CO4	Acquire to system integration skills, documentation skills, project management skills and problem solving skills.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	1	2	1	1	1	1	1	1		3
CO2	2	1	2	2	1	1	2	1	1	1		2
CO3	2	3	3	3	3	2	3	1	2	2	2	1
CO4	1	2	2	1	1	2	2	1	2	2	1	1

B.Tech 8th Semester (Information Technology)

IT-402 Statistical Models for Computer Science

L	T	P
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1. Introduction

Probability Models, Sample Space, Events & their algebra, graphical methods of representing events, Probability Axioms and their applications, Conditional probability, Independence of Events, Bayes' Rule and Bernoulli Trials[1]

2. Random Variables

Random variables, and their event spaces, Probability mass function, Distribution functions, some discrete distributions (Bernoulli, Binomial, Geometric, Negative Binomial, Poisson, Hypergeometric and Uniform), Probability Generating Function, Discrete random vectors, Continuous random variables: some continuous distributions (Exponential, Hyper exponential, Erlang, Gamma, Normal), Functions of random variables, jointly distributed random variables. [1]

3. Expectation

Introduction, Moments, Expectation of functions of more than one random variable, Brief introduction to Conditional pmf, pdf and expectation, Moments and transforms of some distributions (Uniform, Bernoulli, Binomial, Geometric, Poisson, Exponential, Gamma, Normal), Computation of mean time to failure.[1]

4. Stochastic Processes

Classification of stochastic processes, The Bernoulli process, The Poisson process, renewal process, renewal model of program behaviour. [1]

5. Markov Chains

Computation of n-step transition probabilities, State classification and limiting distributions, Distribution of times between state changes, Irreducible finite chains with aperiodic states, M/G/1 queuing system, Discrete parameter Birth-Death processes, Analysis of program execution time. Continuous parameter Markov Chains, Birth-Death process with special cases, Non-Birth-Death Processes. [1]

BOOKS

1. K.S. Trivedi, Probability, Statistics with Reliability, Queuing and Computer Science Applications, PHI, 2001.
2. J.F. Hayes, Modeling of Computer Communication Networks, Khanna Publishing, Delhi.
3. W. Feller, An Introduction to Probability Theory and its applications, 2 vols., Wiley Eastern, 1975.
4. L. Kleinrock, Queuing Systems, 2 vols, John Wiley, 1976.

Course Outcomes (COs)	Description
CO1	Understanding to the basic concepts of Probability and Bayes' Estimation.
CO2	Apply Probability theory to formulate discrete and continuous distributions
CO3	Acquire different optimization functions and methods
CO4	Develop and classify the stochastic model for real-world optimization
CO5	Apply Markov chain, queuing theory and Birth Death process in computation algorithms

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	2			1					3
CO2	2	2	3	1		1			1	1	1	2
CO3	2	2	2	2			1		1	1		1
CO4	2	2	3	3			1		1		1	1
CO5	3	3	3	2			1		1	1		1

B Tech 8th Semester (Information Technology)

IT-404 Advanced Networks

L	T	P
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1. **Introduction to IPv6**
   Overview of IPv6, IPv6 & TCP/IP stack,IPv6 protocol architecture, IPv6 address basics, address notation, unicast address, multicast address , anycast address, IPv6 headers, Routing table problem, static & automatic address configuration, neighbor discovery, stateless address auto configuration, packet filter considerations, IPv6 addresses in the DNS, enabling IPv6 on the DNS server, forward & reverse zones on a primary & secondary servers.

2. **Network services & Routing basics**
   Secure shell(Open SSH), NTP, SMTP, HTTP & HTTPS, NFS, TCP & UDP services, Unicast routing basics, ICMPv6 protocol, static dynamic routing with RIPng, RIPng protocol details, Router architecture strategies.

3. **IPv6/IPv4 Interoperation & security issues**
   Interoperation concepts, Dual stack servers, Application level gateways, protocol translation, DHCPv6, interoperation problem, authentication and encryption, transport and tunnel mode,Inert key exchange protocol (IKE), open problems.

4. **Mobile networks**
   Introduction to mobile IPv4, mobile IPv6, protocol overview of mobile IPv6, enhanced handover schemes, fast handover scheme, network mobility (NEMO), hierarchal mobile IPv6, security in mobile IP, VPN problems & solutions, NSIS firewall, bidirectional tunneling & route optimization

BOOKS:

1. Benedikt Stockebrand, IPv6 in Practice a Unixer's Guide to the Next Generation Internet, Springer Berlin Heidelberg 2007.
2. Youngsong Mun and Hyewon Lee, Understanding IPv6, Springer US 2005.
3. W.Stallings, Cryptography and Network security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.

Course Outcomes (COs)	Description
CO1	Understand the fundamentals of next generation computer networks
CO2	Apply knowledge of the IPv6 protocol in network addresses configuration.
CO3	Ability to apply the concept of mobile IP techniques, and Interoperation concepts for IPv4 and IPv6.
CO4	Analyze the features and operations of various new network and application layer protocols such as IPv6, ICMPv6, HTTPS, etc.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**
CO1	2	2	1	1	1	1						2
CO2	2	3	2	2	3	1			1	1		2
CO3	3	2	2	2	2	2			1	1		2
CO4	2	2	2	2	2	1				1		2

B. Tech 8th Semester (Information Technology)

IT-422 Distributed Operating System

L T P

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Unit-1: Architecture of distributed O.S.: Introduction, motivation, system architecture type, issues in distributed O.S., Communication primitive.

Unit-2: Distributed mutual Inclusion: Introduction, classification preliminaries simple solution, non token based algorithm, Lamport algorithm, Ricart algorithm, Mackawa's algorithm, A generalized non token based algorithm,, token based algorithm, Broad cast algorithm, Heuristic algorithm, tree based algorithm, comparative performance analysis.

Unit-3: Distributed dead lock detection: Introduction, dead lock handling strategies, issues in deadlock detection & resolution, Control organization, centralized, distributed & hierarchical detection algorithm.

Unit-4: Distributed file system: Introduction, architecture mechanism for building, design issues, log structured file system.

Unit-5: Distributed Scheduling: Introduction, motivation, issues in load distribution, component of load algorithm, stabilizing load distribution algorithm, performance comparison, selection of a suitable load sharing algorithm, requirement for load distribution, task migration, issues in task migration.

BOOKS:

1. Mukesh Singhal & N.G. Shivaratri, Advanced concepts in operating systems, TMH 2001.
2. A S Tanenbamn, Modern operating systems, PHI.
3. A. Silberschatz, P.Galvin, G.Gagne, Applied operating system concepts, Wiley

Course Outcomes (COs)	Description
CO1	Understanding of architectural details of distributed operating system.
CO2	Design algorithm for mutual exclusion.
CO3	Design distributed deadlock detection and resolution strategies.
CO4	Knowledge of file management system.
CO5	Analysis of load allocation mechanisms.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	2	1	1							1
CO2	2	3	3	2	1		1			1		
CO3	1	3	2	3	1		1			1		
CO4	1	2	1	1	1		1	1				1
CO5	2	3	2	3								1

B Tech 8th Semester (Information Technology)

IT-424 E-Commerce

L	T	P
3	1	

1. Introduction & Network Infrastructure of E-Commerce
   E-commerce framework, E-Commerce & media convergence, Anatomy of E-Commerce applications, E-Commerce Consumer & Organizational Applications. Market forces influencing i-way, Components of i-way, Network access equipment, Global information distribution networks, Public issues shaping the i-way.

2. E-Commerce & World Wide Web and Consumer oriented E-Commerce
   Architectural framework for Electronic Commerce, WWW as the Architecture, Security and web, Consumer oriented Applications, Mercantile Process Models, Mercantile Models from Consumer Perspective.

3 . Electronic Payment Systems and interorganizational Commerce& EDI
   Types of Electronic Payment System, Digital token based Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit Card based Electronic Payment Systems, Risk and Electronic Payment System, Designing Electronic Payment System., EDI, EDI Applications in business, EDI: legal, security and privacy issues, EDI and Electronic Commerce.

4 . Interorganizational E-Commerce and Consumer search and Resource Discovery
   Internal information systems, Macro forces and Internal Commerce, Work-flow automation and coordination, customization and internal commerce, SCM, search and resource discovery paradigms, information search and retrieval, E-Commerce catalogs or directories, information filtering, Computer based training and Education, digital Copyrights and E-Commerce.

BOOKS:

1. Kalakota R. & Whinston A.B, frontiers of Electronic Commerce, 2006, Pearson Education
2. Janice Raynolds, The Complete E-Commerce Book, 2/e, CMP Books, 2004

Course Outcomes (COs)	Description
CO1	Understanding of E-Commerce and its models
CO2	Discussion on E-Commerce Applications and different Payment Systems, considering User Authentication, Confidentiality, Security and accessibility
CO3	Analysis of efficient techniques for information retrieval and maintenance

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**
CO1	1	1				3						2
CO2	1	1		1	3	1		2			2	1
CO3	2	2	1	1	1	1						

B. Tech 8th Semester (Information Technology)

IT-426 Artificial Intelligence

L	T	P
3	1	

Unit-1 : Introduction: Definition of AI, Evolution of Computing, History of AI, Classical, Romantic and Modern period, subject area, Architecture of AI machines, logic family, Classification of logic.

Unit-2: **Production System**: Production rules, the working memory, Recognize-act cycle, conflict resolution strategies, refractoriness, Recency, specificity, alternative approach for conflict resolution by Meta rules, Architecture of production system.

Unit-3: Propositional Logic: Proposition, tautologies, Theorem proving, Semantic method of theorem proving, forward chaining, backward chaining, standard theorems, method of substitution, theorem proving using Wang's algorithm.

Unit-4: Predicate Logic: Alphabet of First order logic (FOL), predicate, well formed formula, clause form, algorithm for writing sentence into clause form, Unification of predicates, unification algorithm, resolution Robinson's inference rule, Scene interpretation using predicate logic.

Unit-5: Logic Programming with Prolog: Logic program, Horn clause, program for scene interpretation, unification of goals, SLD resolution, SLD tree, flow of satisfaction, controlling back tracking using CUT, common use of CUT, implementation of backtracking using stack, risk of using cuts, fail predicate, application of cut-fail combination, replacing cut-fail by not.

Unit-6: Default and Non monotonic Logic: Axiomatic theory, Monotonicity Vs Non-Monotonicity, non-atomic reasoning using McDermott's NML-I, problems with NML-I, reasoning with NML-II, Case study of Truth Maintenance System (TMS), Neural network fundamentals.

Unit-7: Imprecision and Uncertainty: Definition, Probabilistic techniques, Certainty factor based reasoning, conditional probability, medical diagnosis problem, Baye's Theorem and its limitations, Bayesian belief network, propagation of belief, Dempster-Shafer theory of uncertainty management, belief interval, Fuzzy relation, inverse Fuzzy relations, Fuzzy post inverse, Fuzzy Inversion.

Unit-8: Intelligent Search Technique: Heuristic function, AND-OR graph, OR graph, Heuristic search, A* algorithm and examples.

BOOKS:

1. A. Konar, Artificial Intelligence and Soft Computing--Behavioral and Cognitive Modeling of Human Brain, CRC Press, USA.
2. E.Charniak and D. McDermott, Introduction to Artificial Intelligence, Addison Wesley Longman.

3. Elline and Rich, Artificial Intelligence, 2/e ,1992.
4. Rich and Knight, Artificial Intelligence, 2/e, 1992

Course Outcomes (COs)	Description
CO1	Able to distinguish between logical and illogical reasoning.
CO2	Formulate an efficient problem space for a problem expressed in natural language (e.g., English) in terms of initial and goal states, and operators.
CO3	Develop an understanding of the role of heuristics and the trade-offs among, optimality, time complexity, and space complexity.
CO4	Able to select and implement an appropriate search (informed and uninformed) algorithms for a problem by designing the necessary heuristic evaluation function.
CO5	Able to apply the AI techniques to solve real-world problems.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3		3	2	3	2	3	3	3
CO2	2	3	3	3		1	1			1	2	3
CO3	1	3	3	2			1		1		2	1
CO4	1		3	2	1	2	2			2	2	2
CO5	3	3	3	2	1	2	1			2	2	2

B. Tech 8th Semester (Information Technology)

IT-428 Embedded System

L	T	P
3	1	

1. Introduction

Embedded Systems and Architectures. System integration, Hardware/Software Partitioning, Design Considerations and Trade-offs, Structural and behavioral descriptions.

2. Processors

ARM and SHARC processors- processor and memory organization, data operations, flow of control, input and output devices and primitives, busy-wait I/O, interrupts, supervisor mode, exceptions, traps. Memories: Caches, MMUs and address translation; CPU Performance: pipelining, super scaling execution, caching, CPU power consumption.

3. Interfaces and Communication Mediums

Bus protocols, DMA, system bus configurations, ARM Bus, SHARC Bus, Memory Devices-organization and types, I/O Devices-timers and counters, ADC and DACs, keyboards, LEDs, Displays and touch screens , Interfacing-memory and device interfacing. Designing with microprocessors.

4. Programming an Embedded System

Program design patterns for embedded systems, data flow and control/data flow graphs, analysis and optimization of execution time, energy, power, and program size. Processes: multiple tasks and processes, context switching, Operating Systems: Process state and Scheduling, O.S. Structure, timing requirements on processes, interprocess communication and mechanisms.

5. Examples and Case Studies.

BOOKS:

1. W. Wolf, Computers as Components: Principles of Embedded Computer Systems Design, Morgan Kaufmann, 2000.
2. F. Vahid and T. D. Givargis, Embedded System Design : A Unified Hardware/Software Introduction, Wiley, 2002.

REFERENCE BOOKS:

1. S. Heath Embedded Systems Design, Butterworth-Heinemann, 2002.
2. J. Catsoulis, Designing Embedded Hardware, ORA, 2002.
3. J. J. Labrosse Embedded Systems Building Blocks, CMP Books, 1999.
4. G. De Micheli, R. Ernst and W. Wolf, Readings in Hardware/Software Codesign, Morgan Kaufmann, 2001.

Course Outcome (COs)	Description
CO1	Understand the basic concept of embedded system
CO2	Design control structure of ARM & SHARC processors
CO3	Apply knowledge of interfacing in communication media
CO4	Implement the embedded system concept for various applications

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2		1								1
CO2	2	2	3	2	2				1		2	1
CO3	3	2		1	1				1	1	1	1
CO4	2	2	2	1	3	1	1	1	2	1	2	2

B Tech 8th Semester (Information Technology)

IT-430 E-Governance

L	T	P
3	1	

1. **Introduction**
   Overview, Evolution of E-Governance, Scope & Content, Present Global trends of Growth in E-Governance. [1]

2. **E-Governance Models**
   Introduction, Models of Digital Governance, Evolution in E-Governance, Maturity Models, Characteristics of Maturity Levels, Key Focus Areas. [1]

3. **E-Governance Infrastructure**
   Introduction to E-Governance Infrastructure, Stages in Evolution & Strategies for Success, E-readiness, Evolutionary Stages in E-Governance.[1]

4. Vision of E-Governance, E- Government Business Model, Trends & Practices: Indian and International Scenario. [1, 2]

BOOKS:

1. C.S.R Prabhu, E-Governance-Concepts and Case Studies, PHI, Aug 2005
2. G. David Garson, Public Information Technology & E-Governance-Managing Virtual State,1st Edition, Jones & Bartlett Publication.

Course Outcome (COs)	Description
CO1	Understand the importance of E-Governance and present trends in E-Governance.
CO2	Ability to define, formulate and analyze the various digital governance and maturity models.
CO3	Learn the process to be followed in evolution of E-Governance infrastructure.
CO4	Analyse the vision of E-Governance with respect to Indian and International scenarios.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		1	1	1		1	1					1
CO2	1	2	1	1				1	1			
CO3	1	1	2	2				2	1			
CO4		1	1	1		2	2		2		3	1

B.Tech 8th Semester (Information Technology)

IT-432 Natural Language Processing

L	T	P
3	1	

1. **Introduction**
   Origin, imposition, representation, role of knowledge, use of prolog for Natural Language Processing (NLP), Finite State Transition Networks(FSTN), notation, representation and traversal of FSTN in Prolog, Finite State Transducers(FST), implementation in Prolog, limitation of SM.

2. **Recursive and Augmented Transition Networks (RTN)**
   Modeling recursion, representation, traversal, implementation in Prolog, push down transducers, implementation, advantage and limitations of RTN, augmented transition networks.

3. **Grammar and Parsing**
   Grammar as knowledge representation, words, rules, structures, representation in Prolog, sub categorization, definite clause grammars, classes of grammars and languages, top down and bottom up parsing, comparison strategies, BFS and DFS, storing intermediate results, ambiguity, determinism and lookahead.

4. **Well formed Sub-string tables and Charts**
   Well formed substring tables, active charts, rules of chart parsing, initialization, rule invocation, house keeping, implementation of top down and bottom up chart parsers, search strategy, alternative rule invocation, implementing flexible control, efficiency.

5. **Features and the Lexicon**
   Feature theoretic syntax, feature structures as graphs, feature structures in Prolog, subsumption and unification, the status o rules, implementing PATR in Prolog, chart parsing with feature-based grammars, representation of lexical knowledge, implementing a lexicon in Prolog, DAGs versus terms

6. **Semantics**
   Compositionality, meaning as reference, translation to a meaning representation language, computational semantics as feature instantiation, transitive verbs and quantification, ambiguity, preferences and timing, building semantic checking in to the grammar.

7. **Question answering and Inference**
   Question answering, evaluating DBQ formulae, standard logical inference, implementing forwards inference in Prolog, the pathological nature of logical inference, primitives and canonical forms, classes and inheritance, plausible inference and defaults

BOOKS:

1. Gerald Gazdar and Chris Mellish, Natural Language Processing in Prolog, Addison Wesley.
2. Allen James, Natural Language Understanding, Benjamin Cummins
3. Briscoe, Edward J., Boguraev and Branimir K, Computation Lexicography for Natural Language Processing, Longman/Wiley.
4. Schwartz, Steven C, Applied Natural Language Processing, Petrocelli.
5. Winograd, Terry, Understanding Natural Language, Academic Press.

Course Outcomes (COs)	Description
CO1	Able to understand the various statistical models that are used to process the natural language
CO2	Design and development of parsing tree and able to tag speech models to the tree.
CO3	Familiarity to various applications of NLP as speech recognition and others.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**
CO1	1	1	1		1	1				1		1
CO2	2	2	2	2	1	1	1					2
CO3	2	2	2	2	2	2	1					2

B Tech 8th Semester (Information Technology)

IT-434 Multimedia Techniques

L	T	P
3	1	

1. Introduction

Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Motivation for multimedia usage, Frequency domain analysis, Application Domain & ODA etc.Multimedia-Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software – Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.

2. Tools & Multimedia building blocks

Multimedia – making it work – multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different Compression algorithms concern to text, audio, video and images etc., Working Exposure on Tools like Dream Weaver, 3D Effects, Flash Etc.,

3. Multimedia and the Internet

History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-Ins and Delivery Vehicles, HTML, VRML, Designing for the WWW – Working on the Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media games.

4. Multimedia Current Developments

Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing,
Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology.

BOOKS:

1. Steve Heath, Multimedia & Communication Systems, Focal Press, UK, 1999.
2. Tay Vaughan, Multimedia: Making it work, TMH, 1999.
3. K.Andleigh and K.Thakkar, Multimedia System Design, PHI, PTR, 2000.

Course Outcome (COs)	Description
CO1	Learn current multimedia technology developments
CO2	Classify various multimedia features based on tools, like dream weaver, flash etc.
CO3	Apply multimedia engineering principles and techniques in real-time application development.
CO4	Design multimedia projects using various production platforms

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1		1			1						
CO2	2		1	2	2	1						
CO3	2	2	2	1	1							
CO4	2	3	3	2	3				2		2	

B Tech 8th Semester (Information Technology)

IT-412 Advanced Pr. II

L	T	P
		2

1. Create a calculator that can be used for adding subtracting multiplication and division.
2. Write an application to use WMI to retrieve information about your pc.
3. Write an application to create a File & Folder Browser.
4. Write a program in VB.NET to send an E-Mail via SMTP.
5. Write a program to create a MDI web browser.
6. Write an application to access the registry in VB.NET.
7. Write a program to retrieve a web page source.
8. Create a slot machine game using standard controls & random number generator.
9. Write a program to create a word processor.
10. Write a program for encryption & decryption.
11. Write an application to capture screen.
12. Create a drawing application in VB.NET.
13. Write an application in VB.NET to play MP3 files

Course Outcome (COs)	Description
CO1	Understanding Visual Basic.NET concepts
CO2	Create basic Visual Basic .NET real-world applications
CO3	Implement programming fundamentals, e.g. procedures, functions, selection etc.
CO4	Design algorithms to solve various computational problems and translate same into a working VB.NET program.

Course Outcomes (COs)	Programme Outcomes (POs)											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1				1							2
CO2	2	3		2	2				1			2
CO3	2	2	2	2	2				1	1	1	2
CO4	3	2	3	3	3		1		2	2	2	3